Supplement to the "Queensland Agricultural Journal," February, 1926.

VOLUME XXIV

QUEENSLAND AGRICULTURAL JOURNAL

Issued by direction of

The Hon. the Secretary for Agriculture

Edited by J. F. F. REID

JULY to DECEMBER, 1925

QUEENSLAND AGRICULTURAL JOURNAL.

VOL. XXIV. PARTS 1 TO 6.

GENERAL INDEX.

Page.

A.

B.

C.

D.

E.

F.

G.

T.

Page.

U.

V.

W.

Y.

INDEX TO ILLUSTRATIONS.

INDEX TO ILLUSTRATIONS—*continued.*

INDEX TO ILLUSTRATIONS—*continued.*

A Cross in this space is a reminder that your Subscription to the Journal expires with this number.

ANNUAL RATES OF SUBSCRIPTION.
Farmers, Graziers, Horticulturists, and Schools of Art FREE on prepayment of 1/- to cover postage. Members of Agricultural Societies, 5/-, including postage. General Public, 10/- including postage.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXIV. 1 JULY, 1925. PART 1.

Event and Comment.

The Current Issue.

Pig-raisers have much to interest them in Mr. Shelton's additional notes on the marketing of pigs in Queensland, while poultrymen will find Mr. Rumball's note on breeding very useful. Citrus fruit improvement is discussed by Mr. Prest. The concluding instalment of Mr. Grenning's paper on softwood plantations is another special feature of this month's Journal. Silos and silage are dealt with by Mr. Gibson, and in two valuable reports Mr. Hubert Jarvis covers recent fruit fly investigations. Notes on the oviposition of the bean fly by Mr. Holdaway is another useful contribution. Topical interest is served by a report of an interview with Dr. Elkington on conditions in tropical Queensland, and a short reprinted article by Mr. Theodore on the Seventh State. Regular features are also of unusual interest and readers generally will welcome the July number.

Banana "Bunchy Top" Disease.

In a recent Press communication the Minister for Agriculture and Stock (Hon. W. Forgan Smith) stated that the committee of scientists which, with head-quarters at the Tweed, is conducting its investigation into the occurrence of the "bunchy top" disease in Southern Queensland and New South Wales is doing excellent work. Not only does it appear that the disease is being controlled, but indications favour the finding of a remedy that will effect eventually its eradication.

Cassava Cultivation.

The report of Mr. G. B. Brooks, who returned recently from Java, whither he had been sent on a mission of inquiry into methods of cassava cultivation, and where he obtained a supply of cuttings of high yielding varieties, will be awaited with interest. While in Java Mr. Brooks visited all the principal cassava-growing areas, and observed closely field and factory operations on a number of large estates where cassava is grown and milled on an extensive scale. Arrangements were made for a supply of cuttings sufficient to plant 100 acres and meet all requirements, including a special selection of varieties from one of the plant-breeding stations conducted by our Northern neighbours. Mr. Brooks was also much impressed with the extent of the cultivation of leguminoseae in Java as green manuring and cover crops, particulars of numerous varieties of which he obtained in respect to habits of growth and fertiliser value. Samples of seed were also secured by him for experimental purposes.

Imperial Preference on Sugar.

The news that the House of Commons has approved of a preference on Dominion-grown sugar is of much importance to Queensland. The duty on sugar formerly was £25 13s. 4d. a ton. Subsequently the Imperial Government agreed to allow a preference of one-sixth of that duty, amounting to £4 5s. 7d. a ton. Later, this preference was reduced to £1 18s. 10d., and afterwards it was proposed to revert to the former scale of preference and this is, apparently, what has been done. It will mean that sugar from the Dominions sold in Great Britain will now be favoured with the original tariff preference of £4 5s. 7d. a ton. Not only will this apply to sugar, but, apparently, to the sugar content of jam or any other similar commodity of which sugar is an important component. As jams are often made up of something like 50 per cent. sugar they will enjoy, accordingly, proportionate preference. The decision of the Imperial Parliament was welcome news in sugar circles.

Country Women's Association.

The Country Women's Association is becoming a valuable factor in rural life and its activities are followed with great interest by those who are in sympathy with its very worthy aims. His Excellency the Governor, Sir Matthew Nathan, addressing branches of the association, recently stressed strongly the need to strengthen the association which, he said, creates a greater friendliness between various classes of people than could be arrived at or bridged by any other means. It brings the women of rural districts in close touch with each other, and no country in the world demands an association of this kind more than this State, and more especially those portions of Queensland which are as sparsely populated as our Western areas. The activities of the association are of interest to all its members. The Government wants to improve the amenities of rural life and the movement provides objectives towards which all the women of Queensland, both in the country and towns, may, meeting on common ground, work for their common good. In alliance with the Bush Nurses' Association the Country Women's Association is proving a powerful and very fine factor in the rural life of Queensland.

THE SUGAR INDUSTRY.

THE PROBLEM OF SURPLUS PRODUCTION.

MINISTERIAL STATEMENT.

At the recent Sugar Conference at Brisbane immediate problems facing the industry, together with suggested solutions, were reviewed. Proposals for dealing with this year's estimated surplus were also considered, and the address of the Minister for Agriculture and Stock (Hon. W. Forgan Smith) at the Conference on the points raised has a particular interest for canegrowers.—Ed.

Addressing the recent Sugar Conference, the Minister for Agriculture and Stock (Hon. W. Forgan Smith) said:—

I think at this juncture it would be advisable to say something in connection with the business before the meeting. You have a motion which reads:—

> "At meetings of the Councils of The Australian Sugar Producers' Association and The United Cane Growers' Association, it was unanimously resolved that the whole of the ensuing season's crop of cane be harvested, and that the making of the necessary arrangements to give effect to this decision be entrusted to the Sugar Board."

On that an amendment has been proposed, which reads:—

> "That the Sugar Board be requested to allocate to each mill throughout Queensland the percentage of sugar it bears towards the amount necessary to meet Australian requirements, such percentage to be calculated on the capacity of each mill during a standard length of crushing, and any surplus to be exported at world's parity."

The amendment and the motion contain very definite principles, and they require to be fully considered by every one here.

Why the Conference was Called.

I called this Conference with a view to getting some idea of the wishes of the growers and the millers in connection with the situation. We know that this year there is an estimated surplus of sugar, which has to be exported. This is the second year in succession in which there has been a surplus. Speaking from memory, I think there have been only four surplusses during the last twenty years. Climatic and other conditions have resulted in such a state of affairs existing. Every indication points to the belief that you are confronted with a normal growth of cane which is in excess of the sugar requirements of the Commonwealth. We have also to take into consideration the fact that any exportable surplus can only be exported at a price much less than the standard price which we consider to be just, having regard to Australia's standard conditions or cost of production.

Increasing Production.

We have to consider whether that surplus should be dealt with this year, and what shall be the future policy for next year and the years that are to come, because if expansion continues at the present rate this situation will confront us each year. In that connection we must remember that the available sources of production have increased considerably during the past year or two. Germany and Central Europe have overtaken their production of pre-war times and they are now in a position to produce as much beet sugar as they did prior to the war. In many of the European countries that standard has been increased, and a recent communication from the Minister for Agriculture in Great Britain indicates that he is proposing that a bounty be given for five years on the growth of beet sugar. They have demonstrated the fact that sugar beet can be grown successfully in England. The avenues of absorption are becoming narrower by reason of increased production, and that must result in a continued low world's parity for sugar.

That resolves itself into the position that you must consider whether you can continue to grow to any large extent more than Australia's normal requirements.

Position of Governments Concerned.

I now come to the motion. That deals with this season's crop. We must take into consideration the embargo on the import of sugar to which the Commonwealth Government have acceded, and which the Governments of the Commonwealth and the State, in conjunction with sugar representatives, are parties to. It is outside the scope of the normal policy of the Federal Government to impose an embargo on importations. There is a wide difference in policy between a protective tariff and an embargo. Under a protective tariff importations can be made provided the tariff duty is paid, but in the case of sugar, there is an absolute embargo on the importation of any sugar whatsoever, without the direct permission of the authorities. You have been given this protection with a definite end in view, that the sugar industry of Queensland and Northern New South Wales may be encouraged to the extent of producing the normal requirements of Australia. You are protected against the importations of cheaply grown sugar, so that the Australian standard of living may be maintained. That, briefly stated, is the position with regard to the Governments who are parties to this agreement.

Export of Surplus.

Now, it is proposed that a surplus be dealt with in various ways. The motion provides that it shall be all crushed and exported, and that the producers be paid on a 60 per cent.—40 per cent. basis, the price to be paid for the 40 per cent. quota to be dependent upon what is realised above costs.

Limitation of Areas.

Suggestions have been made that the areas be limited to Australia's requirements, in other words, that the amount of cane which represents this surplus be left on the land. My own view is that it would be a fatal and criminal policy to do that, because this potential wealth has been produced. Nature has been bounteous, and to destroy any wealth actually produced would bring about the violent opposition of the whole of the Australian people who certainly, in my opinion, would not stand for a policy of protection which enables anyone in an industry to destroy what might be termed "the bounty of Nature." We may, therefore, assume that public opinion generally is opposed to the destruction of wealth once it has been produced. That is a point I wish emphasised, because public opinion is something that determines the public policy of every Government, no matter what party may be in power. That is an important point. Public opinion and the view of the man in the street animates and influences very largely the policy of the Government in power, irrespective of parties.

Influence Upon Employment.

Again, you have as an industry to bear this in mind. In addition to the general opposition that would come from people opposed to wealth destruction, the further argument would be used that "Here is an industry with a policy specially provided for it destroying practically £3,000,000 of potential wealth, closing the avenues of employment and closing the avenues of the distribution of wealth"—because the production into sugar of that surplusage of cane means employment in the mills, fields, added freight for the railways, added work on the wharves, in shipping, and in the countless ways that wealth permeates throughout the channels of the economic system under which we live.

Personally, I consider it would be an outrage wantonly to destroy any of this surplusage of cane. On the question of how this surplusage is to be handled the movers of the amendment join issue with those who support the principle contained in the motion. In that connection there are very important points to be considered in addition to the immediate viewpoint you are dealing with to-day. There is the question of collectivism generally. We have formed, as part of the deliberate policy of Queensland, a method of pooling the available sugar resources of Queensland, that is to say for the past nine or ten years it has been part of the deliberate policy, not only of the Government but of all sections of the sugar industry, to stand united as an industry, pooling the resources of that industry and sharing equitably any advantages that have been obtained as the result of that policy.

The Crux.

What do you propose to do with the surplus? Do you propose that the losses which will inevitably be sustained by the export of a large quantity of sugar shall be borne evenly over the whole industry, or shall a different proportion prevail in the districts in which the industry is carried on? That is really the crux of the whole situation.

We have very shortly, as a Government, to issue a proclamation acquiring the whole of the crop of sugar in Queensland and a price has to be stipulated in the proclamation. Under the amendment there would have to be a different proclamation for each district, because the proportion being worked out on a different basis in each district, that would have to be taken into consideration when such a proclamation was issued.

In addition to that, one of the weaknesses that I see in the amendment is in the term "capacity of each mill." There are certain mills that only recently did not crush up to their capacity. The cane was not there. Consequently sugar had to be imported from other countries due to the fact that those mills did not work up to capacity by reason of the fact that they had not the cane to convert into sugar. I do not see how a differential policy could be approved of or justified generally in the community. The figures that were quoted by Mr. Powell indicate to me, if those figures are even approximately correct—someone pointed out that there were discrepancies—but if they were approximately correct, and if we were to go forth from this room and say that at Gin Gin, for example, or some of the mills in the Mackay district, they would get, say, 78 per cent. or 80 per cent. of the sugar paid for at the rate of £27 a ton, and that a mill in another district in Queensland would get only 50 per cent. paid for at the full rate, I do not think that the Government could justify its attitude under such a system in the public mind. That is my own view, and I think it my duty to give it.

Concern for the Small Grower.

I, personally, and also the Government I represent, would not like to see the small grower penalised in any way, particularly growers in areas where they have not had the advantages of good seasons when the price was £36 6s. 8d. a ton, and so on. Unfortunately, no policy can be brought into operation that does not adversely affect some one. Every Act of Parliament, every administrative act, affects someone's interests directly or indirectly. All we can hope to achieve is an equitable policy which, towards the whole of a section of a people, or the whole of an industry, can be justified on the ground of equity. Mr. Biggs referred to the average small growers, and showed that the tonnage grown was small. That is unfortunate. No doubt the small man on a three-quarter crop would be badly affected.

A Serious Position.

There is the position as I understand it. It is a serious one, and while I do not want to attempt to influence you in any way, gentlemen, the position is before you. It is your industry, and on your decision the future of the industry will depend. I feel it my duty as Secretary for Agriculture and representative of the Government, and also as the representative of a large sugar district, to outline the position as it appeals to me, from a broad viewpoint; the industry as a whole and the State as a whole.

United Front in The Industry.

Certainly it could be shown that some policy could be introduced to provide a minimum standard of living for the man who grew a small acreage, or to provide a bounty, without detrimentally affecting the industry, that should be provided, but my own personal opinion is this—and I never seek to evade an expression of my opinion; matters of expediency will not animate me—you cannot have the principle of collectivism and act individually at the same time. If you differentiate between the various districts in the State it is the beginning of the end of the united front in the sugar industry, and one district would be worked and operated against the other. You must consider that and determine which district would win if there was competition between the various sections. It is of the utmost importance that the united front presented by all sections of the industry be maintained, and that nothing be done to divide the various districts.

Bureau of Sugar Experiment Stations.

CANE PEST COMBAT AND CONTROL.

Mr. E. Jarvis, Entomologist at Meringa, near Cairns, reports to the Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) under date 27th May, 1925:—

Further Experiments with Paradichlor.

An Experiment Plot was established at Meringa this season on highland red volcanic soil among a crop of second ratoons of D.1135, which at the time of injecting with paradichlor. were from 12 to 18 in. high; the cane having been cut very late (15th January).

Owing to pressure of work (the farm having changed hands about that time) the present owner decided to plough out these late ratoons.

On 18th February (about six weeks after cutting) we treated one-tenth of an acre with ½-oz. doses, placed 4½ in. deep, 1 ft. apart, and about 6 in. from centre of stools, on both sides of the rows of cane.

At the time of injecting no cultivation had been given, the trash still remaining on the surface; but as this crop had been left uncut until after grey backs had laid their eggs, I concluded it would be a good spot for injecting, since egg-laden females of *albohirtum* generally prefer to oviposit among standing cane when it chances to be growing alongside young ratoon or plant crops.

This proved to be so in the present instance, as an examination of five stools taken at random yielded an average of 22 grubs per stool.

Unfortunately, it was rather late for injecting (18th February), as the wet season had commenced, 15.20 in. of rain having fallen during the preceding thirty-seven days. Such opportunity, however, of putting in an experiment plot on an area where the cane was certain to be completely destroyed by grubs was too good to miss; despite, therefore, of the probable continuance of rainy weather the work was carried out in the manner described above.

Wet conditions again set in a couple of days later, the rainfall during the subsequent period up to the end of March (forty-one days) being 35 inches at our laboratory; so that only six days were recorded, at intervals, on which some rain did not fall.

At the beginning of April I was advised by the grower that the only cane remaining green on this area of ratoons was that which had been fumigated. Upon visiting the spot, I found such to be the case, and that practically every stool around the treated area was either dead or fast succumbing to grub injury.

Owing to non-removal of trash and lack of any cultivation whatever the cane had not, of course, had a chance to make growth during the interval of seven weeks from date of injecting.

Arrangements were at once made with the grower to leave this, and an adjoining control plot, undisturbed when the ratoons surrounding it should be ploughed out; and accordingly I had the trash removed, the weeds chipped, and a light dressing of basic super given both to the treated and check plots; the ground was scarified about 3 in. deep between the rows on 27th April to within about 1 ft. from centre of stools, in order not to injure surface feeding-roots around the base of the plants.

The accompanying photograph, which was taken three days earlier (24th April) shows one side of the treated plot, together with portions of three rows of the control. The few stools of fallen cane seen in the foreground of the latter plot at A are dead and brown, but still cling to the soil, the rest of this grub-eaten cane having been eaten out of the ground when about 18 in. high, and been mostly blown away.

Not a living stool remains on the control area; while on the treated plot one sees by contrast seven rows of green stools covering a space of 136 ft. by 28 ft., unaffected by grubs.

The data obtained from this experiment plot at Meringa is of exceptional interest, showing that even during wet weather one can successfully fumigate cane-grubs with paradichlor. on well-drained land, provided the cane be not high enough to constantly shade the ground between the rows. It was found also that evaporation of the

paradichlor. injected had been checked at intervals after heavy falls of rain, and after remaining about seven weeks underground two-thirds of a ¼ oz. injection had evaporated, thus leaving two scruples still in the ground to carry on fumigation for another fortnight or three weeks.

Wireworm Control.

Complaints have come to hand of late from various growers of injury to cane sets by wireworms, the larvæ of which damage or destroy the eyes and developing shoots, thus preventing a uniform strike.

This pest causes enormous damage to a number of crops in many parts of the world. Experimentation, however, has shown that calcium cyanide promises to be an effective fumigant; but before making definite statements regarding its possibilities against wireworms in our Northern canefields, it will be necessary to conduct a few laboratory and field experiments—a branch of activity which we hope to undertake in the near future.

(1) Calcium cyanide is sold in the form of dust, granules and flakes, costing about 1s. 7d. per lb. Upon coming into contact with the air or damp soil it gives off hydrocyanic acid gas which is exceedingly deadly to animal life. The two chief factors influencing its efficiency appear to be moisture and temperature; the former of which, when excessive, tends to break down the calcium cyanide; forming ammonia, and also absorbing and lessening the amount of gas generated.

During low temperatures, the wireworms being somewhat sluggish are not affected by the fumes to the same extent as when thoroughly active. Application is made by drilling it into the soil—which should not be loose or too compact—in such manner as to bury the flakes or granules at about the level at which wireworms are feeding.

In dry ground the fumes are said to be operative during a period of from three to four days, but in a wet soil no cyanide could be detected after two days; the amount applied in both cases being 150 lb. per acre.

(2) Poison baits have given good results, one of which consists of rice shorts or rice bran roasted dry in pans over a fire, these having a strong odour which is said to be attractive to wireworms. This roasted substance is moistened with water and moulded by hand into small compact balls, which are then placed in the ground about 10 ft. apart.

A week or ten days later they are taken up, broken open, and the wireworms removed and destroyed. The baits can then be remoulded and reset. A single bait used twice on a heavily-infested spot has yielded as many as ninety wireworms. Another method consists in setting in furrows baits of bran or shorts to which have been added a small quantity of Paris green or white arsenic. It is said to be possible to eradicate this pest by the use of poisoned bran-mash during two successive seasons, as "skip jack" beetles (into which wireworms ultimately develop) will readily eat the poisoned bait even when there be an abundance of unpoisoned food available. Such bait was found to be as effective after ten days as when first distributed.

Another very successful bait consists of bran, Paris green, amyl acetate, and water, distributed over the bottom of furrows ploughed at regular intervals.

(3) Crude naphtahlene applied at the rate of 3 cwt. per acre has been found effective against wireworms.

(4) Draining the land is an important controlling factor against this pest.

(5) Increasing the humus content of the soil, and heavy rolling are also well known remedial measures; the latter tending to prevent these larvæ from moving easily.

(6) Deep ploughing of the ground before planting, and collection of the wireworms by hand are sometimes advocated.

Field Experiments Against Termites.

Towards the end of last month a couple of Experiment Plots were established at Jarvisfield, in the Burdekin district, in order to test the merits of certain insecticides against the large cane termite *Mastotermes darwiniensis* Frogg. An area of one-tenth of an acre, consisting of thirteen rows of a chain in length, was employed as a test plot for dehydrated tar; seven rows being treated and six left as controls.

The cane sets after being dipped in the tar were allowed to drain in various ways, and afterwards planted in the usual manner.

Unfortunately, one of the experiments against this white ant had to be postponed owing to the absence of suitable plants; there being no termite-infested cane showing just above ground.

A field test with calcium cyanide against *Mastotermes darwiniensis* Frogg. was carried out on a small scale; a line of stools 66 ft. long being treated the day after planting with doses of two scruples, injected 1 ft. apart on both sides of the rows, at a depth on a level with the sets, and 3 to 4 in. from same in a lateral direction.

A row of cane plants was treated also by Mr. G. Bates, who had charge of this work, with paradichlor.; the doses in this case being ¼ oz. injected on both sides of stools, 12 in. apart, 4½ in. deep, and 5 in. from plants.

Several termite-infested farms were visited, and it was encouraging to note that growers on the Burdekin are bestirring themselves and endeavouring to combat the ravages of white ants. Mr. J. C. L. Kamp claims to have obtained excellent results from the application to fence posts, logs, stumps, &c., harbouring these termites of a bait composed of arsenic and molasses; the manufacture of which is described by him —in a report circulated amongst farmers of the district—as follows:—"A two-pound fruit tin of arsenic was mixed with a tablespoonful of caustic soda, the mixture covered with water, causing the soda to boil and thoroughly dissolve the arsenic. This was then added to four gallons of molasses and thoroughly stirred."

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations has received the following report (22nd May, 1925) from Mr. W. Cottrell-Dormer, who is investigating pests and diseases in the canefields:—

Herbert River.

Diseases.—The disease question is now well in the hands of the staff of the two mills of the district, and the growers would seem to fully realise the necessity of co-operation, as in no instance did the writer hear any whisper of dissension on the question of plant control. At the time of visiting most of the growers were busy planting, and all abided by the decision of the Mill Pathologists as to the suitability of the cane they were using for planting purposes. Gumming disease, which has made these control measures necessary, is, of course, still well in evidence, though not to the same extent as last year, as many acres of ratoon Clark's Seedling have been ploughed out and replaced by plant crops of Korpi, Q.813, and other canes which so far have shown but very little susceptibility to gumming. H.Q. 409 is another cane which has become very popular, but which needs watching, as having shown slight tendencies of weakening resistance.

On this occasion the writer devoted most of his time to those localities lying west of Victoria, with the exclusion of Long Pocket and Toobanna, so that nothing can be said as to whether gumming is on the increase or decrease on the Herbert River; however, it is safe to say that in those districts which have been visited twice the cane was looking a good deal healthier than it was last year, probably owing to the advent of good seasons.

Leaf Scald disease was met with only on one occasion on the Stone River, where it was also met with last year, so that this disease would appear to be at something of a standstill.

Insect Pests.—Very slight evidence of the presence of grubs is showing at Seymour and on the Upper Stone River, but there is no indication of severe damage. Moth Borers and Beetle Borers are doing but slight damage.

The Giant White Ant (*Mastotermes darwiniensis*) was met with in the Rollingstone district, where it was found infesting timber on a sandy ridge. This insect had done slight damage to a neighbouring cornfield, but had not yet been known to attack sugar-cane. Growers of this district are referred to the section of this report dealing with the Lower Burdekin district.

Cane Killing Weed.—The Cane Killing Weed (*Striga* sp.) was found occurring on one farm on new forest land at Waterview, 14 miles from Ingham, on the Townsville line. Three or four rather large patches of cane in a field of H.Q. 426 had been destroyed or seriously stunted by this weed. At the time of visiting the weed was all dead (it being an annual), but it appeared to be the same species as occurs in the Home Hill district. The only sure remedy for this parasite is that of digging it out and destroying it before it seeds. Its roots attain a depth of some 6 or 7 in., so that chipping is of no value, since the underground stem possesses many scales or buds which quickly sprout up when the parent plant is cut down.

Lower Burdekin.

Diseases.—Three serious diseases are known to occur in this district—viz., Leaf Stripe, Mosaic, and Top Rot.

Leaf Stripe disease is especially prevalent in the Klondike area, though it is also found at Airdmillen, and to a less degree in other localities. The variety most affected is B. 208. Growers finding this disease in their crops of this cane should plough out all affected fields after cropping and substitute it with more resistant varieties for at least two years. Badila, Q. 813, M. 1900 Seedling, and others could be used for this purpose according to their suitability to the field in question.

Mosaic disease was found to be fairly prevalent in the Ayrdale district in H.Q. 426, and is, if anything, on the increase. It is advisable, therefore, that growers in this locality obtain a fresh supply of this variety from another district, say Airdmillen or Ivanhoe, and cease using their own cane for plants.

Top Rot, though very prevalent throughout the river farms, has done very little damage indeed this year.

At the completion of work in the Lower Burdekin district a brief visit was paid to Mount Pelion and St. Helens, where living samples of cane affected by a rather serious fungus disease, which occurs in these localities, were gathered. This disease, by arrangement with Professor Goddard, is to be studied at the University, as well as by this Bureau, since it is an indigenous disease, and will require careful research work before measures can be suggested for its control.

Insect Pests (White Ants).—Although the annual damage due to grubs undoubtedly aggregates higher than that done by white ants, the active interests of the members of the farming community of this district appears to have focussed itself far more on the latter pest than on the former; it is fitting, therefore, that prominence be given in this report to the white ant question. During the course of this visit the writer made it a point of visiting as many of the growers who were known to have termite-infested farms, and of discovering as many more who had the pest without it being generally known, as was possible during the time at his disposal. Thus twenty-two of the farms visited were found to be sheltering white ants, all of these farms being situated on the northern side of the Burdekin, since the southern side was not visited.

It was found that the white ants were distributed in the Ayr district over a large tract of land having somewhat the shape of a crescent, with its western point lying at Waterview, its eastern point a mile or so west of Pyott's Beach, and its belly mostly close to the Burdekin River, which makes a big curving sweep as it approaches the delta. Fortunately, this crescent-shaped tract of country does not represent an area of unbroken infestation; Maidavale, Ayrdale, Macdesme, Anna Branch, and Seaforth are found to be the main centres of this pest, between the tips of the crescent.

Although *M. darwiniensis* is so well distributed in the Lower Burdekin, it is only known to attack cane in a few places. This insect is a dweller of sandy soils especially, and it will in some cases remain established on a sandy ridge or knoll for a great many years without doing appreciable damage to cane growing nearby in heavy soils. However, in those parts where this insect is habitually attacking sugar-cane it is doing so "with a vengeance" and causing great loss to the growers concerned. Besides this great loss in sugar-cane is the loss in timber. *Darwiniensis* is a foe who works in the greatest of secrecy and delights in preparing surprises for the "man on the land." A grower stated that one night, some two years ago, two of the legs of his bed sank through the floor of his room shortly after he had retired. This indeed was a surprise to him, and was the first intimation he had received of the presence of this giant white ant; on examination he found that his house was riddled, the boards being about as strong as cardboard, and the posts in some cases unsafe to lean against, with the result that a new house had to be built, and that only the iron roof of the old residence was of any value for building purposes. However, this case is rather remarkable, since when a great number of these white ants are at work a soft, dry crackling sound can be distinctly heard as thousands of pairs of jaws chisel in the wood, and six times as many thousand tiny feet scurry through the vaults and passages of the "termitiere," and one would be inclined to think that the sleeper would have realised the state of affairs before his bed could have sunk beneath him.

Several of the growers in infested areas have displayed great initiative in the task of controlling the white ant, and success has been obtained by the application of poisoned molasses to timber and cane found harbouring this pest. The poison used is sodium arsenite, formed by the combination of white arsenic and caustic soda. A great deal of guess work has been employed with regard to the proportions to be used in the mixture. The correct proportions are four parts by weight of arsenic to one part by weight of caustic soda (Q.D.A. formula). These are to be mixed dry

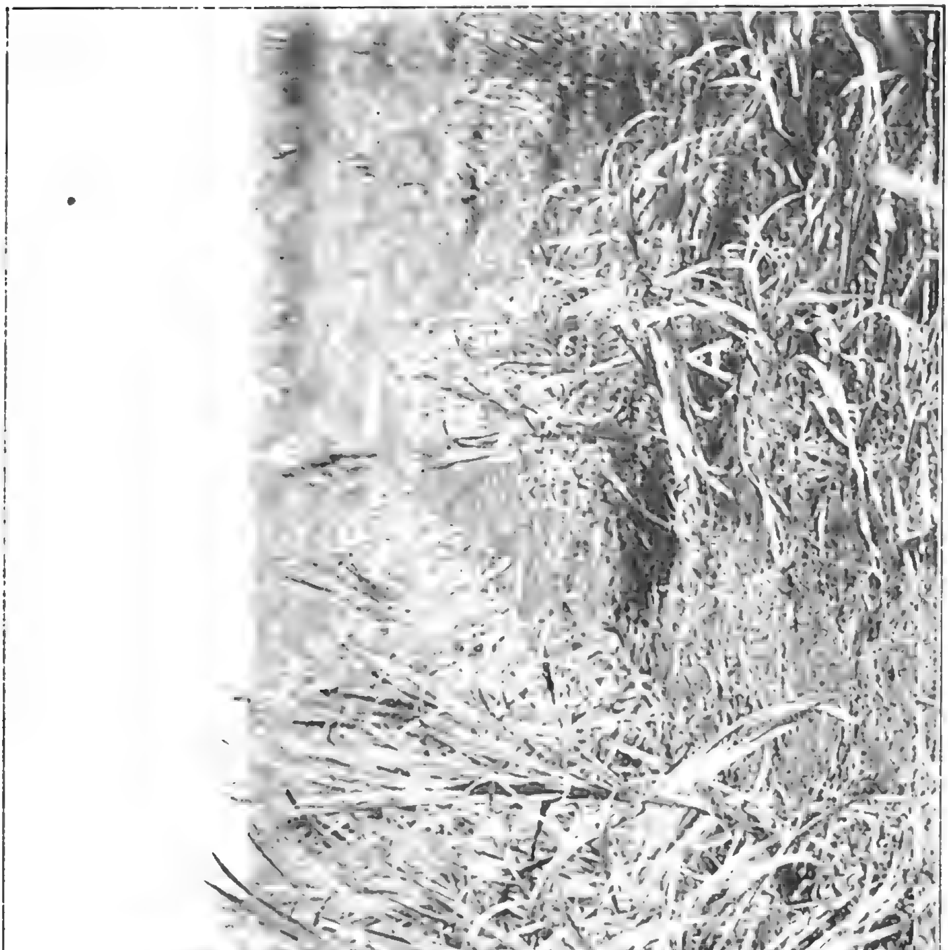


PLATE I.

Experiment Plot of ten weeks' old second ratoons of D.1135; treated with Paradichlorobenzene. *Note Control Plot (indicated by dotted lines) on which the cane has been totally destroyed by grubs, in contrast to treated cane on left hand of photograph.*

and water added gradually until the whole is dissolved. Used in this manner 3 lb. of arsenic added to 6 gallons of molasses make a poison bait of ample strength. If it is found that the molasses is inclined to be too thick to be conveniently used in timber, 3½ lb. of arsenic can be used with the 6 gallons of molasses and a gallon of water added. In order to treat timber, holes are bored into the wood or made with a sharp axe, and the poisonous mixture poured into the tunnels with an old teapot or squirted in with a glass syringe. Three or four tablespoonfuls have been found sufficient as a dose to treat an average sized fence post.

It has been observed by some farmers that dead termites are sometimes found in untreated timber lying close to treated timber, and the question has arisen: Are the white ants cannibals? White ants of other species have been proved cannibals, and it is quite probable that this species indulges in similar habits, which would account for the finding of dead termites in the untreated timber; however, this discovery could also be accounted for in the following way—namely, that besides wood, sugar-cane, skins, &c., the food of termites also includes what is known as proctodeal and stomodeal foods. Proctodeal food consists of that food which has been cast out after having been once digested—*i.e.*, excreta, while stomodeal food is that which has only been partly digested—namely, regurgitated food; thus in a community of white ants food may pass through three or four stomachs before it is finally disposed of and used for building purposes or for lining the tunnel walls, so that if this food contains a small quantity of arsenic several members of the community may succumb through the mistake made by one in eating of the bait. In order that full advantage may be taken of this slow poisoning, it is advisable that the white ants be disturbed as little as possible during the application of the poison and for some weeks after, lest they be too quickly scared away from the treated area.

It is not claimed that poisoning white ants in this way will completely eradicate them from the district, as nests will unavoidably remain in the timber country in outlying localities. Nevertheless, it is in the interests of the canegrowing community of Ayr that all growers whose farms harbour white ants, poison or burn all timber containing the pest. Co-operative work of this nature cannot but bring *Mastotermes darwiniensis* down to a comparatively harmless minimum. Arsenic may be obtained free of cost from the Lower Burdekin Pest Destruction Board, whose most active secretary, Mr. W. M. Saxby, the writer takes this opportunity to thank for the invaluable assistance he has always tendered him when in this district.

A very good photograph of the white ant and its damage can be seen in Mr. E. Jarvis's latest bulletin (B.S.E.S. No. 18).

Grubs.—This pest has done a certain amount of damage in the Ivanhoe district, but this damage does not in any way compare with that suffered by some of the more northerly areas. Several affected farms were visited and advice given. During the course of inspections digger wasps were seen visiting flowers, so that this friend of the farmer is apparently well established here.

FIELD REPORTS.

The Southern Field Assistant, Mr. J. C. Murray, reports under date (19*th May,* 1925):—

Homebush.

Cane here looks well, although so far as this area is concerned it is unlikely there will be any over-production. Farmers are ploughing and planting and generally putting "their house in order" before the season begins. They are fortunate in having to deal with a minimum of disease, the only serious affection noticed being Mosaic on a limited scale in a field of Malagache. The owner assured me that this disease has been present for many years in the Homebush district, and has spread to a very limited extent. This observation suggests that Malagache, which is, and has been a staple variety here for years, is fairly resistant to Mosaic disease.

Good results have been obtained from the use of burnt lime. According to figures supplied, it costs about £3 8s. to lime an acre of ground near the old mill site. That covers cost of material, cartage, and labour. The correct way to treat a paddock with burnt lime is to place in heaps about land, cover with soil, allow to

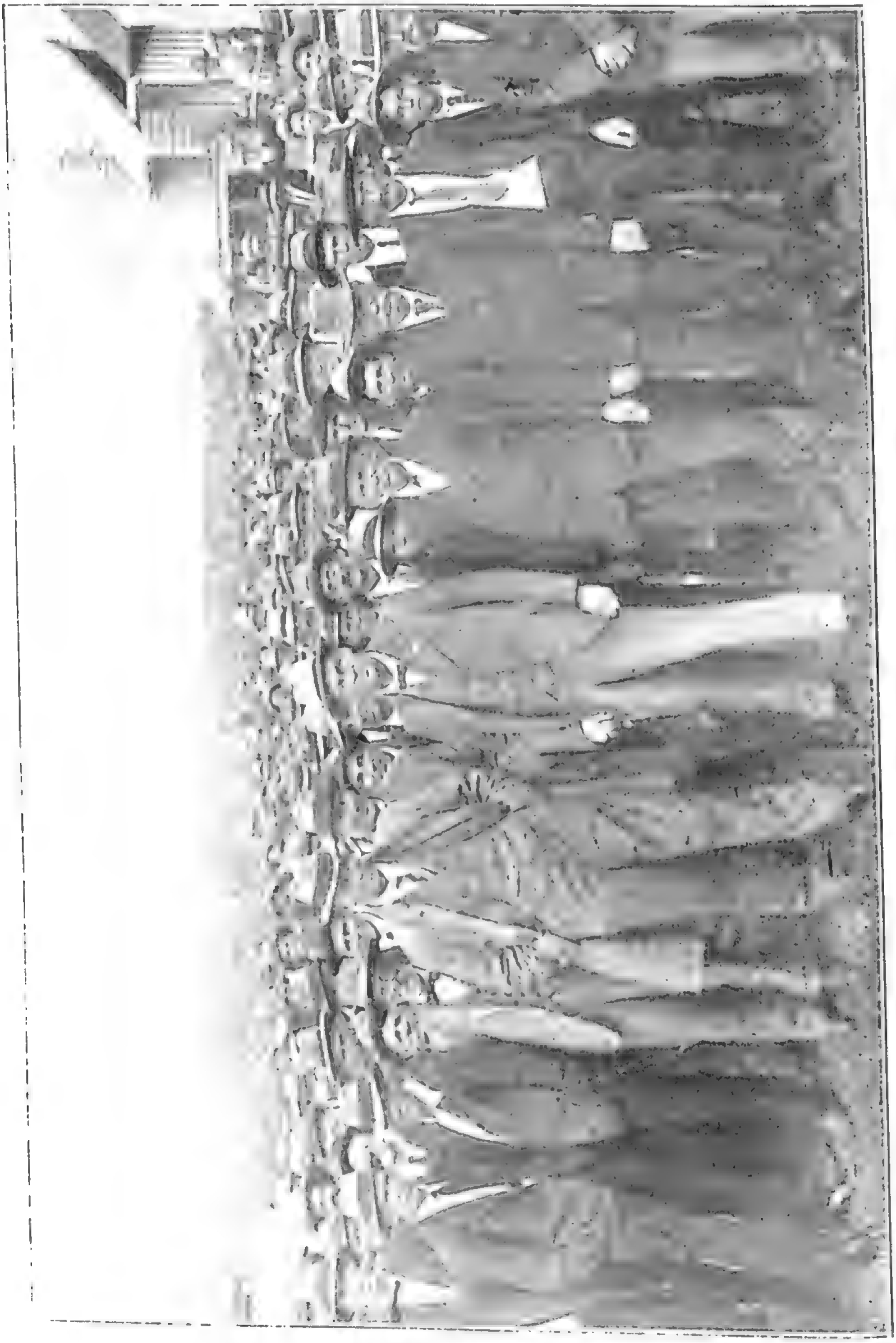


PLATE 2.—FIELD DAY, SUGAR EXPERIMENT STATION, MACKAY.

PLATE 3.—FIELD DAY, SUGAR EXPERIMENT STATION, MACKAY.

1. Mr. Easterby meets the early arrivals.
2. The oldest Cane Farmer in Mackay.
3. The Cane Farmers arriving at the Station.
4. The Farmers' motor cars

air slack, spread in absence of wind, plough in, and let ground spell for six weeks. If possible, follow with a crop of cowpeas, which, by the way, grows best in a well-limed soil.

Pests.—Borers cause whatever loss there is from this source. While the borer itself may not cause serious damage, the holes they make very often allow the entrance of injurious fungi which cause loss at the mill and, if planted, bad strikes. It would be a good idea, if farmers noticed fungus hanging round the plants they were planting, to make their planters watertight and treat the sets with a fungicide. This is a disinfectant, destructive to the lower forms of plant life (the fungi), but not strong enough to injure the higher forms. If cane plants are immersed for an hour in 50 gallons of water to which half a pint of formalin has been added, they will probably find that the percentage of misses caused by fungi will diminish.

Eton.

Farmers are finishing planting. Crops, generally, look healthy. There is a small amount of Leaf Stripe and Mosaic. The former may spread if growers do not take the precaution of destroying affected stools; and where the disease is appearing, to use the abovementioned fungicide. However, there is absolutely no cause for alarm, the suggestions being intended as useful in preventing further spread.

H. 109, E.K. 28, M. 1900, E.K. 1, H.Q. 285, Cheribon, H. 227, N.G. 24A, N.G. 24, N.G. 24B, 7 R. 428, and Q. 813 are showing well. There is a small quantity of Q.855 doing well also. Some details of appearance of these are as follows:—

E.K. 1—Purple, long internode, slightly waxed, eyes prominent, foliage fibrous and spreading at tip, pronounced ring at node, good ratooner and standover variety, rind cracks freely and therefore susceptible to attack by fungi.

E.K. 2—Green, long internode, slightly waxed, eyes flat, good stooler and ratooner, erect, good root system. Foliage spreads and droops slightly at tip. Light ring of wax at node. Seldom cracks, therefore not readily attacked by fungi.

E.K. 28—Greenish-brown, small hard eyes, internode long and slightly waxed, pronounced wax ring at node, erect, good stooler and ratooner, erect foliage, good rooter, green leaf sheath.

Q. 855—Red cane with a purple blush, the red gradually disappearing as the cane matures, slightly waxed on nodes, long internode slightly oval, blue leaf sheath, foliage fleshy and erect, eyes prominent. Good stooler.

In experimenting farmers are recommended to keep other varieties entirely separate from the main crop, which should be confined to not more than three.

On the Eton farms lime and green manures are essential. Pulverised limestone is recommended on a typical soil, about 2 tons per acre, followed by a crop of cowpeas.

Koumala.

Canegrowing has made considerable headway in this area. There is a great deal of land in this and other districts between the 21st and 23rd parallel that is suitable for other crops, particularly bananas. People who are coming to Queensland to settle would do worse than examine the possibilities of these rich scrub slopes. Tramlines have brought land of this class in touch with the railways and as it can be acquired very cheaply, the growing of tropical fruits may relieve congestion in the North Queensland sugar fields.

Cane varieties giving satisfactory results are Q. 813, M. 1900, Badila, and Black Innis.

Pests and diseases are so far giving the grower no trouble. A parasitic plant, commonly known as the "witch weed," is causing small losses. The following is a weed-killing mixture and should be worth trying where the hoe is not effective:—Water, 12 gallons; arsenite of soda, 1 lb. The weed, if sprayed with this, should quickly die. If insects are to be killed 1 lb. of sugar could be added, but it should not be used where stock are present.

PLATE 4

5. The Superintendent takes the farmers around the plots.
6. Farmers examining the Experimental Plots.
7. Luncheon, where the Superintendent addressed the visitors.

PLATE 5.—FIELD DAY, SUGAR EXPERIMENT STATION, MACKAY.

8., 9., 10. The Farmers are interested in the Tractor Trials.

MARKETING PIGS IN QUEENSLAND.—II.

E. J. SHELTON, Instructor in Pig-raising.

The marketing of his products is claiming much closer attention from the man on the land, and in this series Mr. Shelton describes how the farmer's pigs are handled at the selling end. In the first instalment in the June Journal several marketing systems with which Queenslanders are familiar were reviewed, and in the second article are many points of equal interest to the wide-awake pig-raiser.—Ed.

In the previous article dealing with this subject the following marketing systems were discussed:—

(1) The sale of store pigs from farmer to farmer, either direct or per the auction-sale system in saleyards.

(2) The sale of porkers direct to butchers or by auction.

(3) Consigning pigs direct to co-operative or proprietary factories.

(4) Selling pigs "over the scales" at country saleyards, railway stations, &c., to buyers representing proprietary bacon factories and receiving payment for the animals (dressed weight) on a basis of allowing approximately 30 per cent. as the difference between actual live and dressed weight.

(5) The fifth method is that of selling pigs under the pooling system as carried on under the Atherton Tableland Pig Pool.

This system will be referred to in full in a future article, when it is hoped to have a number of illustrations of special interest in this connection. Reference will then also be made to the subject of pig pools and stabilisation of prices. At the moment these matters are being investigated in detail by a select committee appointed by the Council of Agriculture, Brisbane, functioning under the Queensland Producers' Association and the Primary Products Pools Act.

(6) The sale of stud pigs for breeding purposes

will also be dealt with in the August or September issue, for at that time extended reference will be made to the annual sale of stud pigs held during the currency of the Royal National Show and at which on this occasion the largest selection of stud pigs yet placed before Queensland breeders will be submitted to public auction. The stud sales will be held early in Show week, and the writer will be pleased to supply any information available to breeders in connection with the breed, age, pedigree, and other particulars of the stock to be offered.

Queensland Bacon Factories.

It is proposed, in the several issues through which this series of articles will run, to illustrate the various factories and to show how efficiently manufacturers are handling the pigs which arrive at their establishments. The principal fault with our bacon pigs is not that they are handled inefficently when they reach the factory—it is at the production end where improvement is most necessary, as will be shown as we proceed. The illustrations in this issue are from Messrs. Foggitt, Jones, and Co., of Oxley, proprietors of one of the oldest and most efficiently managed factories in the State.

As will be seen from the photograph of the Oxley Factory, it occupies a prominent, well-drained position and covers an extensive area of ground. It is situate some 2 miles south-east of Oxley Railway Station, and is 8 miles or so south of Brisbane. This company have factories in operation also in New South Wales, Victoria, and Western Australia, and have permanently established themselves in the industry.

Inspection of Carcases.

As is the case with all the bacon factories, every pig is carefully examined both before (*ante mortem*) and after (*post mortem*) slaughter by competent officials from the Department of Agriculture and Stock, Brisbane, the Stock Department of which controls the various meat inspectors officiating at the bacon-curing establishments.

Fig. 2 shows Mr. Inspector Wills at work in his official capacity as meat inspector at Oxley Factory.

PLATE 6. (FIG. 1).—OXLEY BACON FACTORY. FOGGITT, JONES, LIMITED, FINE MODERN WORKS ON THE BANKS OF OXLEY CREEK, NEAR BRISBANE.

PLATE 7. (Fig. 2.)

In the course of his inspection the Meat Inspector has located a deep-seated bruise, probably the result of the animal having been prodded by a sharp-pointed stick when in a loading race. Bruising of carcases is responsible for very considerable loss each year. The object of this picture is to emphasise the importance of careful handling at all times.

In his examination of the carcass, both the internal and external surfaces are being inspected, and whilst examining the latter a severe bruise is noted; this has been opened and the partly congealed blood will be seen below the opening. This depicts in a striking manner one of the most serious of the losses to the bacon-curer and to the pig industry in general, for as a result of careless, even brutal, handling of pigs in transit to the saleyards or trucking stations, in trucking, and in delivery to the bacon factories, curers estimate that the losses run into thousands of pounds annually. This certainly emphasises the necessity of careful handling and the provision of suitable saleyards in which the pigs can be handled to more advantage at point of despatch. Some saleyards the writer has inspected are in a shocking condition; they are indirectly responsible for a good deal of the trouble referred to above.

Fig. 3 illustrates another phase of the inspection. In this photograph the slaughterman is busily engaged opening up the carcass and removing the internal organs prior to splitting the carcass down the back and handing same over to the inspector for further attention.

Figs. 4, 5, 6, 7, and 8 illustrate the examination of lymphatic glands in various parts of the carcass and internal organs, and show how efficiently every carcass is handled to ensure freedom from disease of the bacon, ham, &c., passing into human consumption.

Fig. 9 illustrates another phase of factory operations, this being a view of portion of the small goods department at the Oxley Factory. It is not possible to secure good photographs depicting the more detailed operations.

Fig. 10 is a view of portion of the ham and bacon packing department at the Oxley Factory. These various operations will be described more fully in future issues.

There can be no denying the fact that to be successful in raising and marketing pigs the pig-raiser requires to be sound in his knowledge of the job, to give personal attention to all details of management, to have reliable breeding stock, and, above all, a good farm. He requires to be very efficient in all operations, keeping an ever-watchful eye on the growth and development of each animal he possesses, and to carefully study the costs of production.

Trade Classification of Market Pigs.

The farmer cannot expect to receive top market rates for his pigs unless they are correctly classified in accordance with conditions ruling in the markets at the time his pigs go forward. The trade classification necessarily varies from time to time, for market conditions are, unfortunately, not permanently stabilised, nor are public demands always the same; in fact, the consumers' demands have changed so much in recent years that quite a different type of bacon and pork (and also stud) pig is in demand now to the type so popular twenty or thirty years ago. Nor is this variation confined alone to this part of the world, for latest market reports from overseas indicate that the demand is rapidly changing there also, and both the markets of Europe and of the United Kingdom are now calling for the comparatively light to medium weight fleshy bacon and pork pigs so popular and so much in demand in Australia.

To secure the maximum profits in the marketing of pigs it is also necessary that they be of correct type, be properly grown and developed on suitable foods—foods in a condition to be readily assimilated and converted to use in the production of rich red flesh and firm white fat—and that they be properly "topped up" prior to actual despatch. This topping up, as it is frequently called, does not of necessity mean that the pigs should be closely confined in a small and low or dark pen and that they be given all the corn or other grain they will consume during the last two or three weeks of their lives, for pigs require ample exercise and a sufficient supply of green or flesh-forming (usually referred to as protein) foods, in addition to a liberal supply of grain (grain being classed as carbohydrate or fattening food). They also require an abundant supply of mineral foods—charcoal, lime, bonemeal, rocksalt, &c.

It is important also that the pigs be judiciously graded into the various classes prior to marketing, and that special attention be given to careful handling in transit to the factory, this including transit from the farm to point of despatch per rail, road, or steamer and transit to the factory. In this connection attention is called to Fig. 2, in which the Meat Inspector in his search for disease comes across a badly bruised carcass, an occurrence unfortunately all too common, and resulting in very considerable loss to the industry each year. The bruising and damage to carcasses in transit will be referred to again later in this series of articles.

The following table, which sets forth the names, ages, approximate weight and value of market pigs in Australia—and this refers to Queensland conditions particularly—will be found very useful in connection with the preparation for

PLATE 8. (Fig. 3).

The Inspector keeps an eye on various operations in his search for disease. Here he is seen "giving an eye" to the slaughterman whilst the latter is engaged in the removal of the internal organisation of the pig. A point worthy of note is that it is well worth while sparing the time necessary to visit bacon factories in order to become better acquainted with the handling of the carcass at the hands of the manufacturer.

PLATE 9 (Fig. 4.)

INSPECTION OF LYMPHATIC GLANDS IN THE HINDQUARTER.

These glands are not infected as frequently as the glands in the head and neck, hence it is that many carcases pass inspection even if it is necessary to condemn the head on account of tuberculosis. Each gland is carefully incised in the search for diseased areas.

PLATE 10 (Fig. 5).

Discussing the matter of inspection at the time the photograph was being taken, Mr. Inspector Wills remarked that as far as possible every gland in the carcass was examined. This picture shows another group of glands being sliced, for it is only by cutting deeply into each gland that the inner surfaces can be seen. Consumers need have no fear that diseased pigs slip through, for the Inspectors are men well versed in their job.

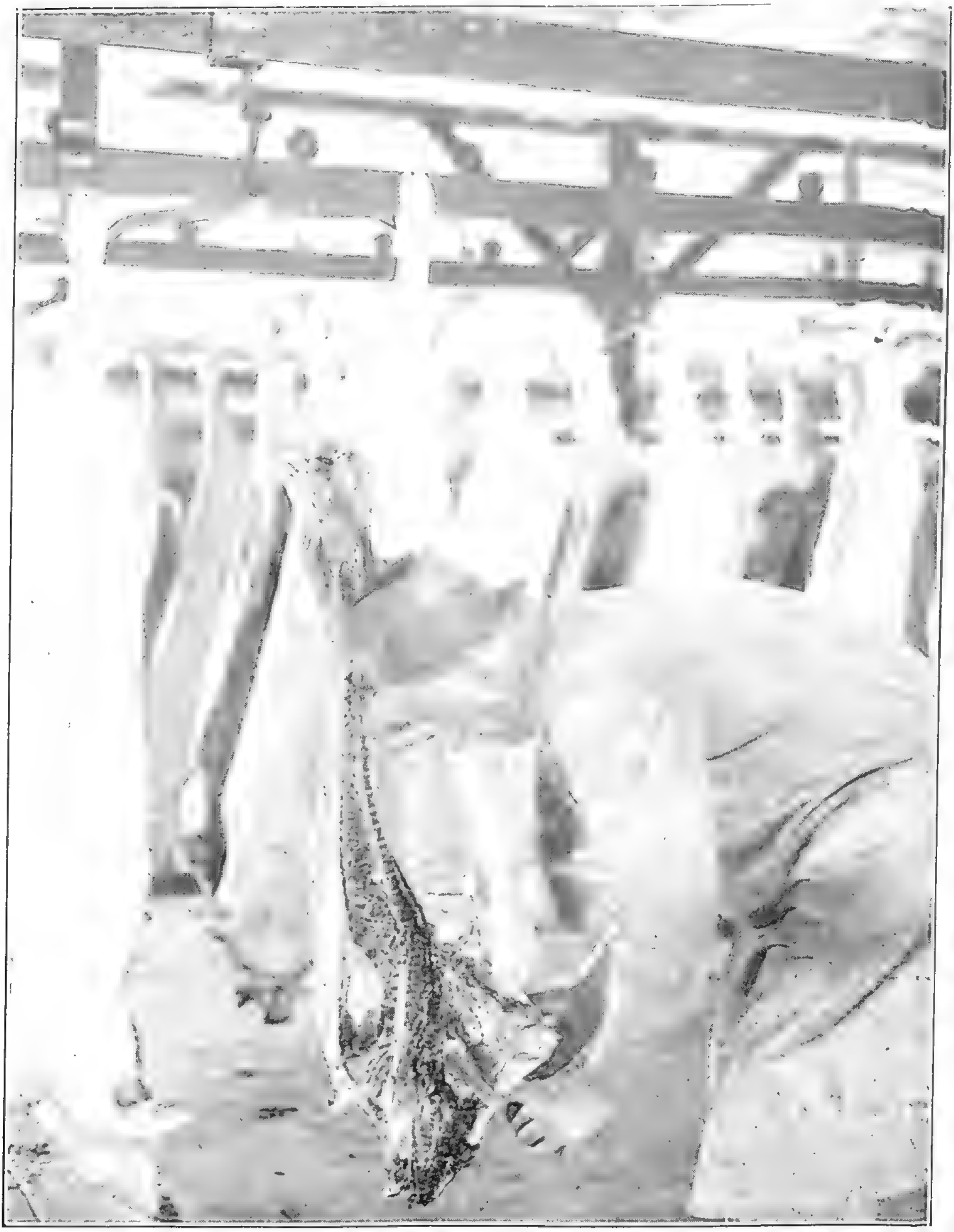


PLATE 11 (Fig. 6).—INSPECTION OF SUBMAXILLARY AND SALIVARY GLANDS IN THE HEAD AND NECK.

It is this group of glands to which extra special attention is paid, for they are the most frequently infected of the various glands throughout the body. The subject is one well worth careful study on the part of every pig raiser.

PLATE 12 (Fig. 7).—INSPECTION OF THE BRONCHIAL GLANDS BETWEEN THE LUNGS.

The various organs are the subject of careful examination also, for it happens occasionally that they are diseased and that condemnation is necessary. The pig is subject to several lung diseases, of which pneumonia appears to be the most frequent. This is the disease most commonly referred to as "pants," a disease in which the lung itself is seriously affected.

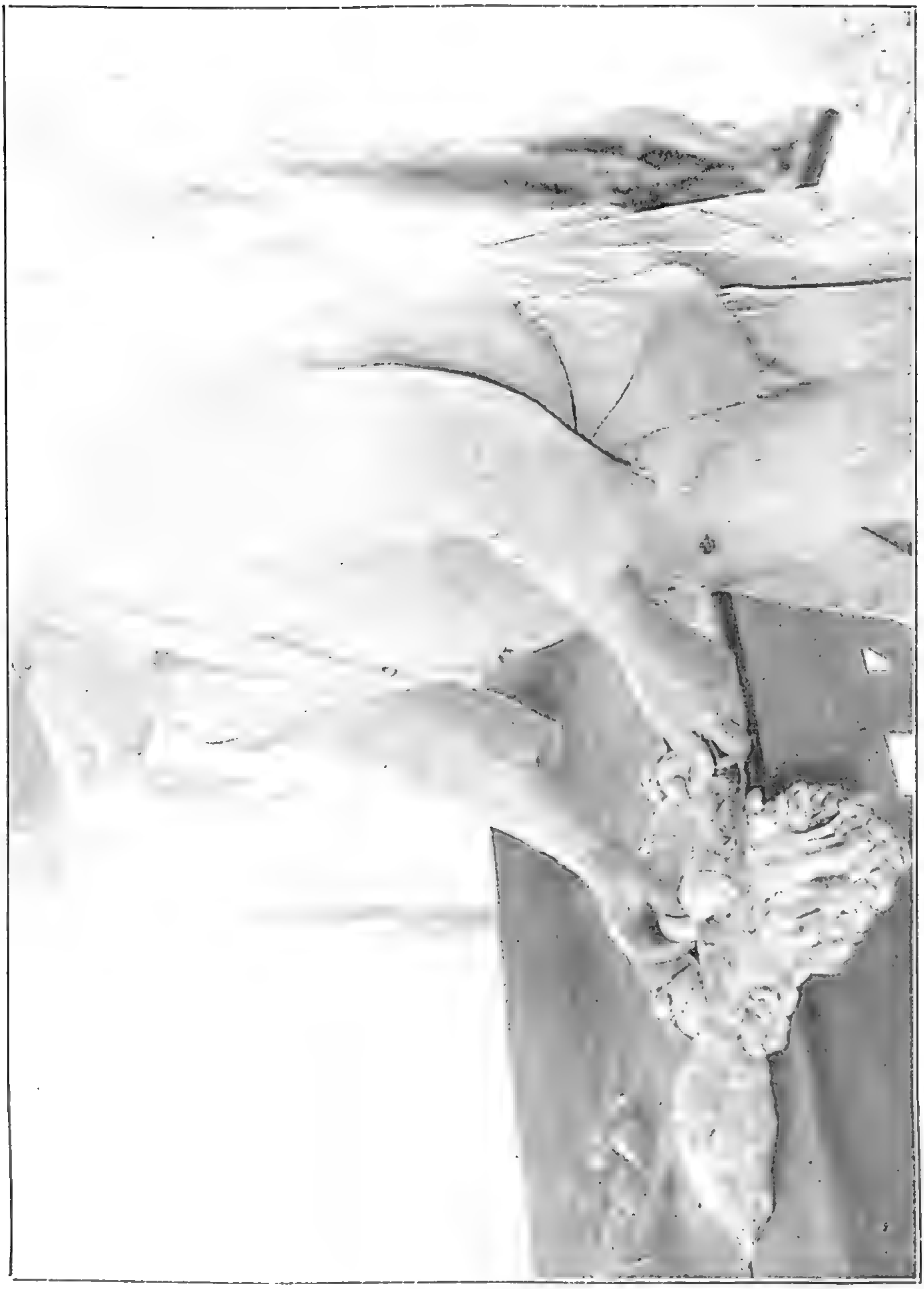


PLATE 13 (Fig. 8).—INSPECTION OF THE MESENTERIC GLANDS IN THE INTESTINES.

These glands are also frequently diseased. Great care is necessary in feeding pigs on food such as meat, milk, &c., per medium of which disease germs might be conveyed to the animal's body.

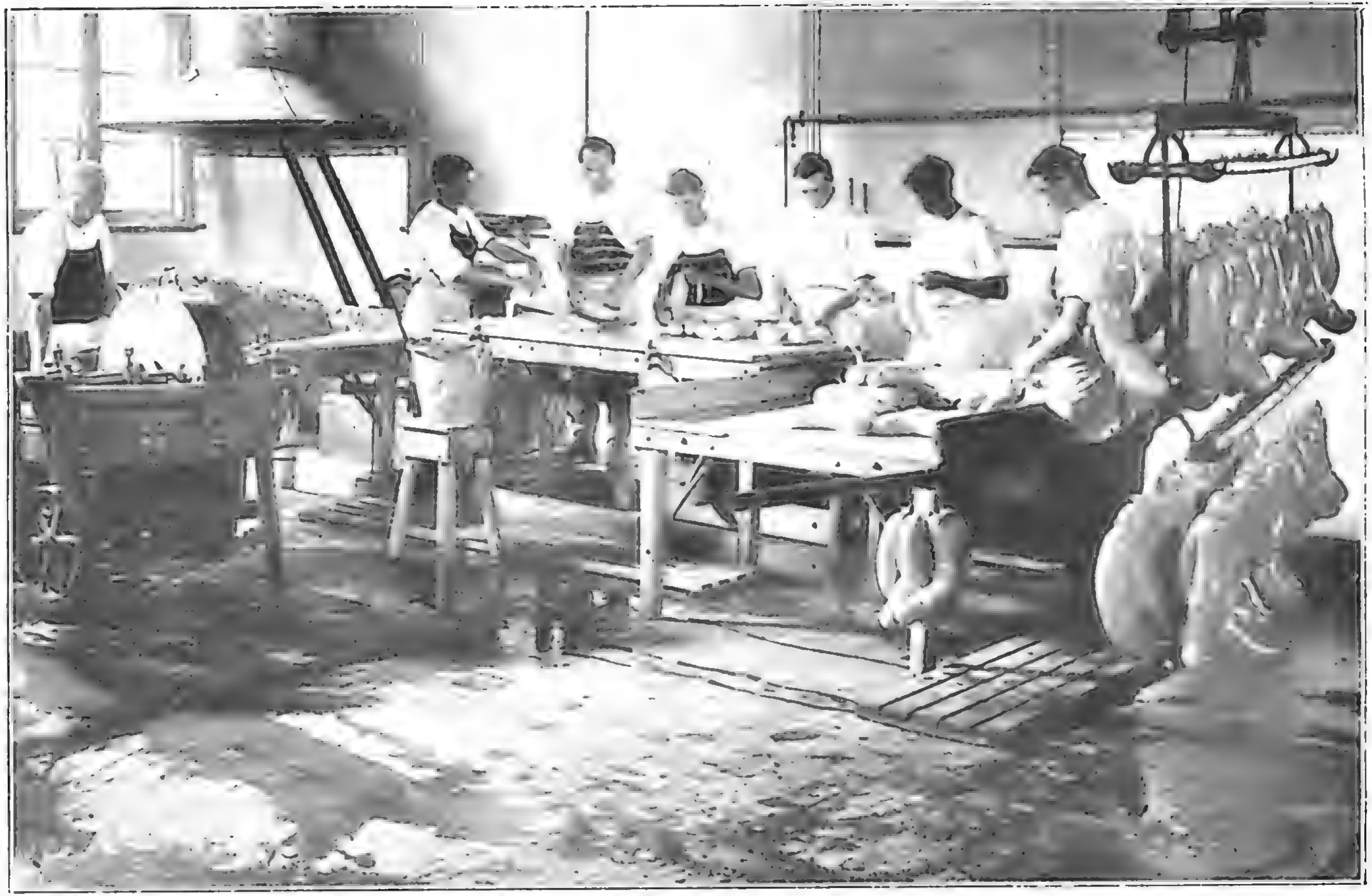


PLATE 14 (Fig. 9).

Portion of the Sausage-room at the Oxley Bacon Factory. The preparation of the small goods is an item of very considerable importance in bacon factories, for many tasty, nutritious items are manufactured from the less valuable portions of the pig's carcass.

PLATE 15. (Fig. 10).

Portion of the Packing Room in which the final touches are given both to the bacon and to the package before it goes forward to the Wholesale or Retail Distributor in its journey to the Consumer. *Many and varied are the operations in a Bacon Factory.*

market (auction sale, &c.) or for factory of every description of pig which the farmer will be handling. The figures given are reliable, and, though approximate only, are quoted as a guide. The demand for pigs of all ages and classes is on the up grade, and though values fluctuate a good deal for all classes, it can be taken as a general rule that the medium weight animal, whether he be marketed as a porker or a bacon pig, is the one most in demand and, under normal conditions, is the most profitable.

MARKET CLASSIFICATION—QUEENSLAND, JULY, 1925.

Name or Grade of Animal.	Approximate Age.	Approximate Weight.	Approximate Value Per Pig.
Sucker or Sucking Pig ..	6 weeks	15 lb. dressed	12s. 6d. to 15s.
Weaner	8 ,, ...	25 ,, alive	15s. to 20s.
Slip	10 ,, ...	32 ,, ,,	20s. to 25s.
Store	12 to 14 weeks ..	45 ,, ,,	20s. to 30s.
Light Porker	4 months	50 ,, dressed	40s. to 50s.
Medium Porker	4½ ,, ...	60 to 70 lb. dressed	50s. to 60s.
Heavy Porker	5½ to 6 months ..	80 to 85 ,, ,,	55s. to 60s.
Light Baconer	5½ to 6 ,, ..	86 to 94 ,, ,,	55s. to 65s.
Medium Baconer ..	6 months	95 to 125 ,, ,,	65s. to 75s.
Heavy Baconer	Up to 9 months ..	1st grade 126 to 135 lb. ,, 2nd ,, 136 to 145 ,, ,, 3rd ,, 145 to 160 ,, ,,	from 50s. to 80s.
Backfatter	Up to 6 years ..	Up to 4 cwt. dressed	£3 to £4
Stag	Up to 7 years ..	Up to 4 ,, ,,	£1 to £3
Chopper	Up to 2 years or more	Up to 3 cwt. dressed or heavier	£2 to £5
Boars	Over 5 to 6 months	Various weights	These are of little value as "meat" pigs

Bacon Factory Classification.

Most of the Queensland bacon factories are paying for pork and bacon pigs in accordance with the following schedule, as at July, 1925. These figures are subject to variation; current rates will always be supplied by the factories on application.

Rates of Payment for Current Month.

Note.—In the case of payment by proprietary factories, this is a straight-out cash payment, whilst in the case of co-operative factories the price represents an advance payment, balance (if any) being paid in the form of bonus or deferred pay at end of each year.

Prime baconers, 95 lb. to 125 lb. dressed weight, 6d. per lb.; 126 lb. to 135 lb., 5½d. per lb.; 136 lb. to 145 lb., 4½d. per lb.; 146 lb. to 160 lb., 3½d. per lb.; 86 lb. to 94 lb., 5½d. per lb. Pigs other than prime according to quality.

Porkers are paid for at 5d. per lb. dressed weight. Fat sows for small goods (referred to as backfatters in the market classification), 2d. per lb. dressed weight. Stags are only worth 1d. per lb. dressed weight.

Boars.—For these there is practically no demand at all, and factories in many instances refuse to take delivery of boars of any age; other factories pay for young boars, say, up to twelve months old, at price paid for fat sows, but aged boars will not be accepted at any price, nor will rough stags.

A limited demand exists for light-weight fat sows at better prices than those quoted above, but the market fluctuates very much, and owners would be well advised to secure quotations from factories before marketing.

A careful perusal of the above figures will show that the principal demand is for good quality porkers and for prime light to medium weight baconers. There is no call for very fat pigs of any age or weight, and the old world champion heavy-weight pigs so much in popular favour years ago are not worth marketing now. So great has been the change in public taste that it is difficult for many farmers to realise this even now.

The three outstanding faults in Queensland bacon pigs during the past year or two have been referred to on previous occasions. They are—

The pigs are being held too long on the farm;

They are, when marketed, very frequently over the profitable limit in age; and

They are, as a class, too fat and too heavy for the most profitable market outlets, this referring to both local and interstate trade. Thus they are less profitable to the farmer than they should be.

The whole of the factories operating in this State agree that this statement is, unfortunately, very true, and they are all anxious that producers should study market requirements more than has been customary in years gone by.

(*To be continued.*)

MAIZE FOR PIGS.

A correspondent told us recently that he had decided, in view of the low market value of maize at the time, there was no better way of converting his crop into cash than by feeding it to pigs. He installed a crusher with the idea of boiling the resultant meal for the pigs. He stated that he had bought a boar and seven sows, the latter in pig, and from his investment he estimated a return up to £250, or perhaps £270, per annum, and asked was that a fair thing. Following was the general reply with special references to the points raised in the letter of inquiry:—

Maize certainly holds pride of place as the most prolific and readily grown grain crop in this State, but to secure best results it must be fed in conjunction with other crops (such as lucerne, &c.) having a higher protein content and a more bulky succulent nature.

In seasons like the present, when there is an abundance of most classes of green food, and when maize is of very low commercial value, it would certainly pay better to convert the maize into pork on the farm than to go to all the trouble and expense of placing it on the market in the form of shelled maize. Hence, the intention of utilising the bulk of the crop in the way indicated is sound, particularly as the expenses connected with marketing of pigs are not excessive.

Maize fed in conjunction with skim milk and lucerne gives even better results, hence the wisdom of keeping also a few milch cows as suggested.

There are many other crops, too, that can be grown and fed to advantage, particularly Dwarf Essex Rape and Skinless Barley, a combination specially to be recommended for the purpose indicated.

With regard to the grinding of the maize core at the time the maize grain is being handled. We have no record of extensive tests being carried out in this State with "corn and cob meal," but Professor Evvard, one of the most prominent American authorities, condemns the practice of grinding the grain and core, claiming that the results do not justify the expense. Experience at the Hawkesbury Agricultural College in New South Wales also leads us to believe that there is little or no feeding value in the core, and the fact that the pigs do not, or would not eat the core ordinarily, seems to indicate that instinct tells them that it contains too high a percentage of indigestible fibre. However, the practice of feeding corn and core meal is carried out at the Warren State Farm, and the manager, Mr. Bechtel, reports good results. I would like to see our correspondent carry out some experiments on these lines, and feed one or two groups on maize meal and one or two on maize and core meal. He would gain some useful and interesting experience and would not suffer any monetary loss. Nevertheless, I advocate the practice of burning the maize cores and feeding them in the form of charcoal, and have always found the results more beneficial than by feeding in the form of meal.

With regard to cooking the maize and core meal and feeding in this form, my opinion is that cooking food pays only when the animals are given that extra care and attention which always results in securing a few extra shillings in the sale pens. If the animals are well cared for, provided with suitable accommodation, and sanitary feeding places, and can be fed in groups of, say, six to twelve, then good results will accrue, and it will pay to cook the food. Whereas, if the pigs are running at large and are fed on a rough and ready "get all you can while you can" system, then it would pay better to feed the maize on the cob and let the pigs do their own grinding, &c. In any case, this feeding of the maize on the cob is preferable in the case of breeding sows and the boar, for it is not necessary in their case to go to the extra expense. Nevertheless, they require ample supplies of green food, &c., as in the case of bacon pigs, and all should have access to abundant supplies of charcoal and wood ashes.

Regarding the estimate of profit and loss, careful attention to detail and expert management mean an immense amount in reckoning up profit and loss. It has been estimated that 1 bushel of corn fed along the lines indicated will produce 10 lb. of pork, this latter at present representing a factory value of 6d. per lb. or 5s. per bushel for the corn as against a much lower sale value; but even if the results were only 50 per cent. as good as this, pig feeding is the better proposition, and it invariably happens that when maize soars to 5s. per bushel, pork also advances up to 10d. per lb. The figures given, however, are a fair estimate of a probable return if conditions on the farm are favourable.

The whole business is one calling for expert management, and seeing that the Department of Agriculture and Stock is prepared to assist settlers in every way possible, there should certainly be a "way out" for our correspondent *viâ* his pig-breeding scheme.—E. J. SHELTON, H.D.A., Instructor in Pig Raising.

LIFE IN THE QUEENSLAND TROPICS.

EFFICIENCY OF WHITE AUSTRALIAN WORKERS.

HEALTH AND WEALTH IN THE NORTH.

The population of the North is increasing faster, proportionately, than that of any other part of Australia, and the prosperity of the North is undeniable. Careful observations show that Northern families neither die out nor degenerate, nor do they show any evidence of commencing degeneration up to the third generation. The tropic-born woman is quite as healthy as the woman born elsewhere. Her children at school ages are taller and heavier than, and at least as mentally able as, children elsewhere in Australia. Life insurance records show that their chances of longevity are rather greater than elsewhere in Australia. Industrial records show that they can outwork any non-British race in the sugar fields under the ordinary present conditions of living.—Dr. J. S. C. Elkington, Director of Tropical Hygiene, Commonwealth Department of Health.

Statements made recently by a distinguished visitor concerning the condition and probable future of the white population of Australia met with an effective reply from Dr. J. S. C. Elkington, Director of Tropical Hygiene, Commonwealth Department of Health. In the course of a Press interview, Dr. Elkington said: ''It is interesting to note that Sir George Buchanan, during his few weeks of sojourn in tropical Australia, would appear to have reached the same conclusions concerning the need for better conditions of housing and living as were expressed by the Australasian Medical Congress which met in Brisbane in 1920. These needs are, of course, obvious enough to any one who visits the North. But when Sir George goes on to describe white labour in the North as 'neither efficient nor economic,' and to quote some unnamed doctor as stating that 'the sole subject of conversation between wife and husband turns on requests by the woman to be permitted to go South for rest and change,' it makes one regret that he has not given a little attention to the recorded opinion of those who have given a lifetime of observation to such matters. For example, a Townsville surgeon (Dr. Humphry), with more than thirty years' experience of the Australian tropics, told the 1920 congress, after expressing his very definite opinion as to the unsuitable houses and the hard life of the Northern working woman: 'If 100 boys were taken out for a week's hard military manœuvring, I believe they would hold their own with any other 100 boys from any part of Australia. . . . Anybody who says the race will not thrive in tropical Australia, to my mind, is talking rot.' Again, a writer in 'Health' in September, 1923, gave as his matured opinion, after more than twenty years' experience in handling labour in sugar plantations in North Queensland: 'The British gangs head the list' (*i.e.*, in efficiency and economy of labour) 'against all comers. . . . The term British is used to cover all white British nationalities, irrespective of whether the men were born in Australia or Great Britain.' The same writer ('C.V.H.') makes it clear that the climatic origin of the individual has no bearing on his capacity for performing hard work in our tropics.

Telling Facts—What a Sociological Survey Revealed.

''Had Sir George Buchanan found time to call at the Australian Institute of Tropical Medicine, at Townsville, where the whole subject of white races in the Australian tropics has been under very careful study for years past, he would have been shown evidence which would have saved him from a number of unfortunate statements and hasty quotations from evidently uninformed and inexperienced sources. The statement (attributed to unnamed medical men in Northern Queensland) that 'women rapidly deteriorate mentally and physically, and the whole white race in the

coastal area under the existing conditions is only kept up by the influx of new blood from the South, otherwise it would in a few generations become enfeebled and ultimately die out,' is totally at variance with observed facts. At the Institute, Sir George could have seen summaries of an extensive series of family histories of North Queenslanders, extending to the third generation, and showing no sign whatever of becoming enfeebled. The originals are confidential, but he could have met a number of the actual people forming these families. He would have had the opportunity to read the results of an extensive sociological survey which was carried out in 1924 on some 740 North Queensland households in seven areas selected for their diversity of climatic and other conditions. From this he could have learned—learned from actually observed facts, not from speculative off-hand opinions—that, despite her hard home life, the health of the ordinary working mother in North Queensland is at least as good as in any other part of Australia, that the fertility of the tropic-born Australian white woman is at least as great as that of the woman born in non-tropical climates, that the average weight and height of tropic-born Australian school children is (after allowing for lighter clothing and for the absence of boots) greater than those of school children in other parts of Australia, and that the majority of the home-mothers amongst these 740 households had been born in the Australian tropics. Sir George would also have learned from the educational records which form a part of the Institute's collected material that the school performances of these tropic-born Northern Australians compare rather more than favourably with those of children in other parts of Australia. He would have been shown the records of the percentages of those rejected and accepted, respectively, over a series of years for the Citizen Forces and for the A.I.F. From these he would have learned that the percentage of rejects for tropical Australia was actually less over some years than for all other parts of Australia, and that in some of the observed years the percentage of cadets rejected in tropical Queensland was less than that for Tasmania, New South Wales, Victoria, or South Australia. For the A.I.F. the percentage of fit amongst tropical Queensland volunteers was greater than that for Southern Queensland.

Life Insurance Outlook.

"If Sir George Buchanan had desired to go into the actuarial side of tropical Australia, a paper by Mr. Elliott, chief actuary of the Australian Mutual Provident Society, was presented at the 1920 Congress, and would have given him full information as to the life-insurance outlook. Mr. Elliott, after conducting an exhaustive analysis of nearly 5,000 policies issued from the Cairns and Townsville offices, concluded thus:—'The rates of mortality deduced from the inquiry were surprisingly low. . . . I have no hesitation in saying that, as far as we know at present, there is no need for life assurance offices to treat proponents who live in North Queensland differently from proponents who live in other parts of Australia.' The condition of living which Sir George Buchanan treats, and rightly so, as matters requiring urgent improvement, thus do not apparently shorten life. Nor, apparently, do the ungranted prayers of the Northern wife-mother for a change South, so feelingly described by Sir George's medical informant.

North Queenslanders in the A.I.F.

"Whilst on this subject, I may mention that some of the best people I have ever seen, in the sense of completely useful Australian citizens, have been Northerners who have never been 'South,' and who have not wanted to go South. They are apt to find the Southern climate unpleasant—for example, I have known Northerners to complain bitterly of the close summer heat of Sydney and Melbourne—and the living conditions cramped and stuffy. That they are well able to bear climatic extremes when necessary, however, is shown by the thousands of born North Queenslanders who went through winter trench life in France and elsewhere. It is a matter of attested experience amongst army medical officers that these men did not show any inferiority to other Australian units under the test of actual war.

The Vigour of Northern Families.

"With regard to the people of the North (apparently all of them) being in what Sir George describes as 'a state of nervous tension,' I can only say that, after more than thirty-five years' acquaintance with tropical Australia, this is the first I have heard of it. The survey made last year covered the principal causes of ill-health amongst women, and the proportion ascribed to neurasthenia is not higher than one would expect to find under the same domestic conditions elsewhere. I mean those of the hard-working house-mother. Sir George points out that cases of delirium tremens are by no means uncommon. This complaint is not infrequent, I believe, in non-tropical places—even in London—but to infer, as Sir George apparently does, that

nervous tension and delirium tremens are rendering it impossible to settle the country is altogether ridiculous. The population of the North is increasing faster, proportionally, than that of any other part of Australia, and the prosperity of the North is undeniable, even to a casual visitor. Careful observations show that, despite the defective housing conditions of a quite considerable part of the population, Northern families neither die out nor degenerate, nor do they show any evidence of commencing degeneration up to the third generation. There has not been time for more than a third generation to develop yet. The tropic-born woman in tropical Australia is quite as healthy and quite as fertile as the woman born elsewhere. Her children at school ages are taller and heavier than, and at least as mentally able as, children elsewhere in Australia. Hospital and family records show that they do not suffer from any greater amount of illness in after life than do persons elsewhere in Australia. Life insurance records show that their chances of longevity are rather greater than elsewhere in Australia. Industrial records show that they can outwork any non-British race in the sugar-fields under the ordinary present conditions of living, and the only chance which coloured labour would have with them would be under much lowered conditions of living. Dr. Breinl, in 1920, showed, by a careful series of observations with the Kata thermometer—a far more delicate instrument than the wet-bulb referred to by Sir George—that the climatic conditions of the North even under the most unfavourable circumstances, did not affect health or output under conditions of the hardest labour. I have quoted North Queensland more particularly in the foregoing, but the same conditions apply to the Northern Territory. It is not the climate nor the housing conditions which have kept Darwin back.

Dangers of Coloured Labour.

"It is perhaps also advisable to point out that tropical Australia differs from every other tropical country in the world, including all those in which Sir George Buchanan's previous experience has lain, in that it has no appreciable coloured population, but is peopled by a white race only. Had it a large coloured population, the housing conditions to which Sir George refers would probably be very much better, but the health and robustness of the white people would be very much worse. The underlying factor which determines success or failure in every other tropical country, so far as the prospects of a white race thriving are concerned, is well known by every experienced observer in tropical hygiene to be that of the extent to which the whites are open to infection with disease from the coloured population living alongside them. The native servant is a useful person to have about the house, so long as one does not go too closely into such matters as what he has last been doing with his hands before he puts his thumb into one's soup, or before he resumes his labours in the cookhouse. The native labourer is cheap, though seldom really economic, but he serves as a reservoir for malaria from which are infected the anopheline mosquitoes which bite his white neighbour. His habits, too, provide a plentiful supply of unpleasant material which the ubiquitous fly is ready to deposit on the white man's foodstuffs. The white man's native cook does not worry much about protecting his master's food when left alone in the kitchen. I have had a fairly extensive experience of the tropics, and have observed these matters rather closely. They provide one excellent reason for strongly preferring white neighbours rather than coloured ones.

"Probably Healthiest Population in Australia."

"Sir George states that he knows that 'the truth is rarely palatable,' and it is, therefore, well that he should have the real commodity. He has based, on the results of a few weeks' visit and a few ill-informed statements, a sweeping condemnation of the pluckiest, the most self-reliant, and probably the healthiest population in Australia. With his remarks on the tin houses I agree wholly, and also with the need for tropical hygienic teaching and practice. These matters were gone into fully at the 1920 Medical Congress. As to the rest of Sir George's remarks concerning the tropical Australian, I can only say that, in all main details, they are at total variance with the results of a long and thorough series of observations which have been carried out in tropical Queensland by trained observers. I feel sure that were Sir George Buchanan to go again over the ground with the assistance of this material, with sufficient time, with adequate personal observations of the people and conditions on which it is based, and with the requisite scientific help, he would feel himself called on to tender a hearty apology to the tropical Australian men, women, and children whom he has so hastily and incorrectly condemned."

THE SEVENTH STATE.

A NATION-BUILDING PROPOSAL.

By Hon. E. G. THEODORE, M.L.A.*

The latent land resources of the far North, which give most promise of effective settlement, are the broad acres of first-class agricultural and grazing lands which extend along the banks of the numerous large rivers which flow into the Gulf of Carpentaria and the northern seas. There is no insuperable difficulty in the way of establishing a new and prosperous State under vigorous administration in Northern Australia. The creation of a new Province with a sovereign Government would rid the Commonwealth of an intolerable burden, and Australia of an ever-increasing anxiety.

Among the people living in the Southern States the popular conception of the character of the country and the climate in the northernmost portions of the Continent are quite erroneous. The absence from the published maps of Australia of detailed features or indications of settlement in those areas extending to the northern shores tends to create an impression of barren wastes and infertility. This impression is enhanced by the knowledge of naked sandy wastes in the interior; the common belief being that desert and spinifex wilderness extends throughout the whole of the area of North Australia. Nothing can be further from the truth.

All around the coasts of North Queensland, Northern Territory, and the northernmost part of Western Austarlia the country extending 200 miles back from the sea is blessed by Providence with a mean average rainfall of 30 to 40 in. in the less favoured districts, and up to 80 in. a year in selected places. There are many thousands of square miles of plateau, covered with the luscious Mitchell, Flinders, and blue grass, similar to those which have made Queensland famous as a producer of high-class merino wool.

Latent Land Resources.

In addition, there are illimitable tracts covered with a rougher natural pasture, which make the ideal cattle runs of colossal size, for which the Territory and Kimberley districts are noted. But the latent land resources of the far-north, which give most promise for effective settlement, are the broad acres of first-class agricultural and grazing lands which extend along the banks of the numerous large rivers which flow into the Gulf of Carpentaria and the northern seas. Rich alluvial flats are found on the Fitzroy, Ord, Victoria, Daly, and Macarthur Rivers and their respective tributaries.

Here are agricultural resources offering immeasurable opportunities for development and settlement, with possibilities of dairying, pig raising; cotton, tobacco, sugar, sisal hemp, cassava, and maize culture, and every type of tropical agriculture. Moreover, almost every known mineral is found in those latitudes, unavailable and undeveloped owing to the lack of transport facilities.

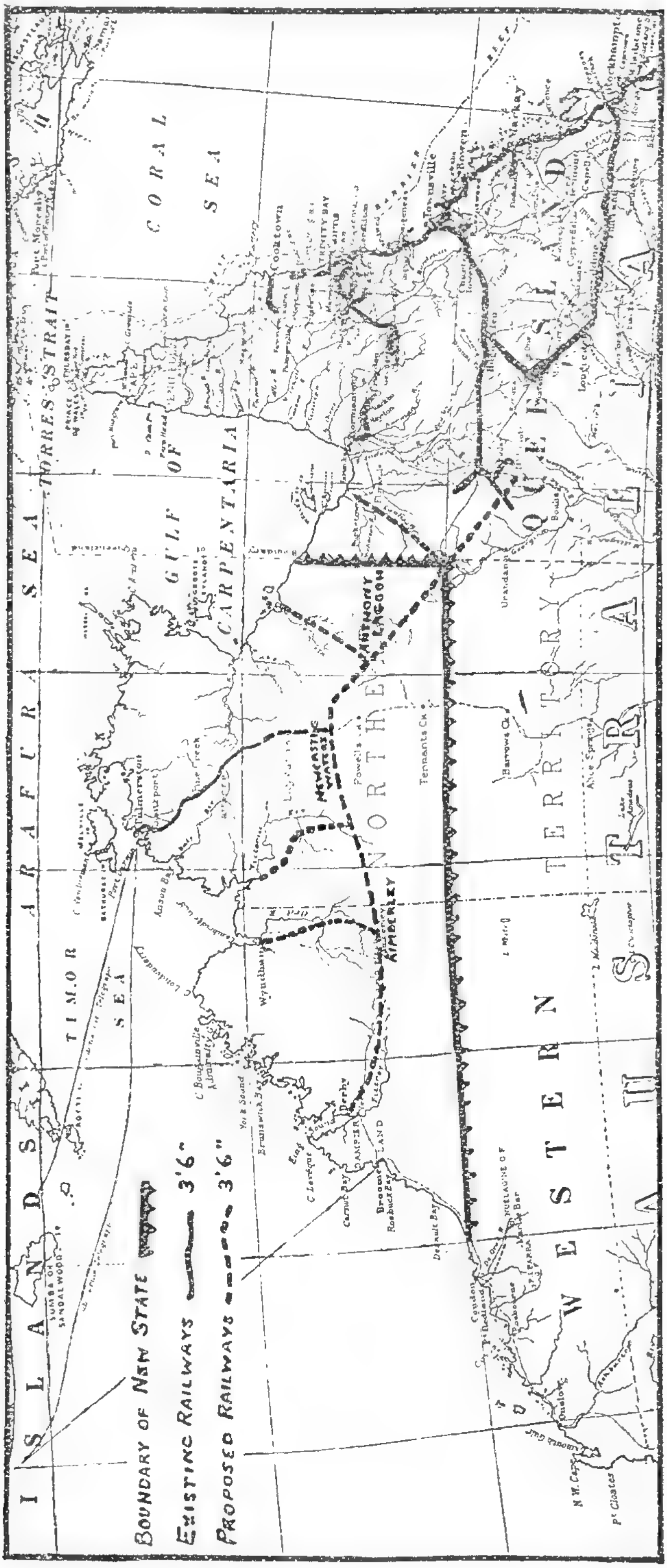
In this immense virgin and potentially rich region, embracing 200,000 square miles within the 25-in. rainfall belt, only 4,000 or 5,000 whites reside.

A Challenge.

Its very richness makes it a source of danger to Australia while it remains unoccupied. It is a constant challenge to the "White Australia" policy. The right of use and occupancy are the only inviolable rights any people have to a territory. How can we deny the claims of an overcrowded country unless we ourselves make a show of settling this fertile and spacious area and developing its resources?

Hence the importance and urgency of the problem. There is no insuperable difficulty in the way. Money is required and a vigorous administration. Harbours, roads, and railways are essential. Land required for close settlement must be

* In "The Home" for June.


Boundary of New State
Existing Railways 3'6"
Proposed Railways 3'6"
ISLANDS
ARAFURA SEA
TIMOR SEA
CORAL SEA
TORRES STRAIT
GULF OF CARPENTARIA
NORTHERN TERRITORY
WESTERN AUSTRALIA
QUEENSLAND
ANTHONY LAGOON
NEWCASTLE WATERS
KIMBERLEY
Cooktown
Townsville
Wyndham
Derby
Broome
Tennants Ck.
Powells Ck.

resumed from the pastoralists. Migrants with agricultural experience must be introduced into the country, the ports developed, and factories to process, treat, and manufacture the primary products of the soil must be provided.

One has but to consider the nature of the task to realise the futility of attempting its management from a place so remote as Melbourne. The authority and resources of a Government are wanted to formulate the policy, to plan the development, to establish the organisation, to raise the funds, to administer the multifarious departmental activities and functions as they arise; but it must be a Government on the spot, not a Government 3,000 miles away.

That is the justification for the creation of a new State in Northern Australia. The new State should embrace the northern part of Western Australia and the Northern Territory, and if necessary a small portion of Queensland to give unity to the scheme of development of the Barkly Tableland.

No Constitutional Difficulty.

A Provisional Government should be appointed to administer this State, and the authority of the Government should be as full as that of the existing Governments in the other States. The Provisional Government would have charge during the developmental stage. Within a few years there should be sufficient permanent residents in the State to elect a Parliament and constitute a responsible Government.

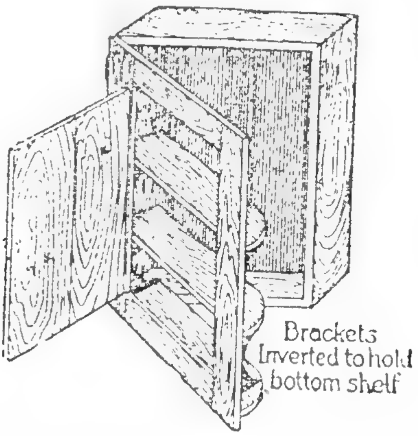
There is no constitutional difficulty in the way of this proposal. The Federal Parliament may erect a new State and grant it a Constitution, subject to the concurrence of the States whose territories are affected.

Nor would the Commonwealth be answerable for the actions or policy of the Government in the new State. The State would have its sovereign Government, which would be accountable to its own citizens. The Commonwealth would be rid of an intolerable burden, and Australia of an ever-increasing anxiety.

A USEFUL DOOR FOR A WORKSHOP.

A workshop cupboard or locker that is recommended for the easy access afforded to its shelves from front or back is shown in the accompanying illustration.

The box, or cupboard proper, minus the shelves, is first mounted upon the wall of the shop. A frame to fit is then hinged to this, in the manner shown, and brackets placed on the inside of the frame in such a position that the rounded shelves will clear the inside of the cupboard when the frame is opened or closed. Within this frame a door is hung, and after latches are provided for both frame and door the cupboard is completed.



In use, anything at the front of the shelves may be easily reached by opening the door; but, if desired to gain access to the rear of the shelves without disturbing or moving the contents, the door latch is left closed and the frame swung open.

Such a cupboard must, of course, be constructed with a sturdy door frame, but its convenience and time saving feature, when small articles are to be found, or when the shelves are to be cleaned, will repay one for the extra trouble in making.—"New Zealand Farmer."

SOFTWOOD PLANTATIONS—II.

BY V. GRENNING, Rhodes Scholar, Working Plans Officer, Queensland Forestry Service.

Australia imported softwood in 1920-1 exceeding £5,000,000 in value Industrial expansion and increasing population is strengthening the demand for softwood supplies. The world's stocks of over-mature softwoods are being rapidly depleted, and already the rate of utilisation exceeds greatly the rate of increment. On account of excessive local demand exports from softwood exporting countries must diminish inevitably, and in thirty years, it is estimated, they will have reached the vanishing point. Australia's softwood resources are very limited. Queensland alone can almost meet her home requirements, but when all her over-mature pine has passed through her mills, the increment of under-girth pine will supply but a small percentage of her demands. There is only one solution —plantations of softwoods. That is Mr. Greening's opinion, and his views on this and other phases of our forestry problem will be read with interest by all concerned in Queensland's timber future. The first instalment in the June issue covered an explanation of planting systems and some points in forestry practice.—Ed.

Forest Finance.

In the establishment of plantations forest finance is a chief consideration. Suppose, *firstly* that a plantation produces 50,000 super. feet log measure per acre on a rotation of fifty years, *secondly* that it is established in an accessible locality, and *thirdly* that the royalty per 100 super. feet is 15s.; then the gross return will be £375 per acre. In other words, if money can be loaned at 5 per cent. then the present value of establishment and maintenance costs in order to clear expenses should not exceed £33. But the present value of these costs should not exceed £10, which in fifty years at 5 per cent. compound interest amount to £115. The net profit then equals £260. But £10 amounts to £260 in fifty years at approximately 7 per cent. compound interest. Therefore after paying 5 per cent loan on money a profit of 7 per cent. would be realised.

From the above example, it is obvious that—(*a*) The nearer the plantation to the market, (*b*) the shorter the rotation, (*c*) the lower the establishment costs, and (*d*) the higher the value of the timber, the greater will be the profit derived from the plantation.

It is therefore most important—

(1) To establish plantations close to the market.

(2) To shorten the rotation by selecting rapidly growing species, adopting correct thinnings methods, and planting suitable localities.

(3) To reduce costs of formation by improving nursery and planting practice and by selecting areas where the cost of clearing is low.

(4) To select the most valuable species.

Before a country can lay down a sound forest policy the following points must be carefully considered:—

(1) What are the country's present timber resources and what will be the future requirements?

(2) What is the present and prospective world situation?

(3) How can the present and future generations be provided for most economically?

The World's Softwood Consumption.

What timber does the world utilise to-day? Softwoods comprise over 80 per cent. of the total consumption. In short, the available timber resources of the world consist chiefly of softwoods. Were hardwoods obtainable in greater quantity, then the percentage consumption of softwood would undoubtedly be reduced, but would always exceed that of hardwood. In America, India, and Europe softwoods are used for railway sleepers, poles, posts, and rails, for which purposes hardwoods are used in Australia. However, even in a country rich in hardwoods the consumption of softwoods per head exceeds that of hardwoods.

Provision for the Future.

Having completed a survey of the present timber resources the question arises: How can provision be made for the future requirements of the country most economically? Might it not be advisable to import timber rather than to invest in extensive plantations? Perhaps! if the world supplies of softwood were inexhaustible.

Great Britain, situated close to apparently inexhaustible supplies of softwood in Russia, Scandanavia, and North America, adopted this policy in the past, but the world situation is now too serious to delay, so she has undertaken a very extensive plantation scheme. Every country should be self-supporting in timber, if economically possible.

Then how can this most desirable state of affairs be brought about? In the first place, the indigenous forests should be put under intensive management so as to obtain the maximum increment per acre. This should be brought about as far as possible by the natural regeneration of the indigenous forests.

The skill of the forester lies chiefly in his ability to so engineer the removal of a mature stand of timber that it is replaced by a completely stocked young stand regenerated naturally. A careful study to determine the optimum conditions of heat, light, and moisture required by the species during germination and establishment is first necessary to ensure the success of the operation. The overwood is removed in one or more fellings extending over a period of years. The admission of light to the ground floor is so regulated as to give the young seedlings all the protection needed during the precarious period of germination and establishment. But such an operation pre-supposes a condition of affairs ardently desired by all foresters, a condition existing only in the well managed forests in France and Germany, where the forests have been under systematic management for some centuries. It pre-supposes the existence of well stocked mature forests, of one or not more than three valuable timber species and no other vegetation of any consequence. There the many systems of natural regeneration with their adaptations can be applied with success. There every forester can evolve his own special modification of a sylvicultural system and secure results.

Unfortunately, these conditions very rarely obtain in other countries. As a result of the destructive selection system applied in the younger countries, *i.e.*, the removal of the better trees of the most desirable species, the inferior species, which are invariably the most prolific regenerators, predominate. The problem becomes complicated. Will it not be cheaper to create plantations than to attempt to regenerate naturally the better species when the removal of the inferior species is very expensive? In short, regenerate the forest naturally when a stand of the desired species can be obtained at a less cost than by planting. In all other cases, plant!

Even this cannot be rigidly adhered to. The financial aspect must be given full consideration in all forest problems, but it is not paramount. The experience of Saxony must not be forgotten. Forest finance proved that it was cheaper to clear all the mature forest and to plant the quickly growing spruce. The balance of nature was upset. The forests were even aged and of one species. Buds disappeared. Insect pests increased and the nun moth wrought such havoc that natural regeneration, uneven aged forests, and a mixture of species were adopted. Large areas of one species, which does not occur alone in the locality, naturally should be avoided.

If a deficiency of either softwoods or hardwoods or both occur in a country, and this cannot be remedied by natural regeneration, plantations must be laid down. Not only can the most desirable species be introduced, but the factors of the locality can be utilised to their utmost to produce the maximum yield per acre, the right spacing can be adopted and the forests can be created close to the market.

Consider the situation briefly elsewhere.

Forestry in Europe.

In France, Germany, and other continental countries the forests are in such a state that they can be regenerated naturally without difficulty. Recourse to planting is now only had where blanks occur and waste land is to be afforested. The foresters of the Black Forest point with pride to their nurseries filled with cabbages.

In the early part of the 18th century the landowners of England appear to have turned their attention from arboriculture to sylviculture. By 1730 extensive planting was general throughout the United Kingdom, while the formation of large nurseries to supply young trees for planting appears to have become an established business between 1730 and 1750. For a century and a-half it was generally supposed that imports from abroad supplemented by private enterprise would always be able to meet the increasing demands for timber. The consumption per head increased rapidly. The imports of timber, wood manufactures, and pulp of wood over a period of ten years (1913-1922) attained an annual average value of £55,000,000, reaching a maximum of £120,000,000 in 1920.

The lack of adequate forest resources was acutely felt during the war, so much so that the Forestry Act of 1919 provided for the planting of 1,180,000 acres of conifers in forty years. For the first ten years the Forestry Commission was charged with the afforestation of 150,000 acres of new lands by the direct action of the State, and the assistance of Local Authorities and private owners, for the afforestation or reafforestation of 110,000 acres at a total cost of £3,450,000.

The Union of South Africa.

Owing to the very restricted natural forest resources of the Union of South Africa and the great necessity of augmenting the timber supplies, afforestation of vacant waste lands is the main channel along which the activities of the Department are directed. Numerous exotic species are employed, these yielding the ordinary softwoods of commerce and the durable hardwood, such as species of Eucalypts, the selection differing in various parts of the country according to the factors of locality. It is estimated that it will be necessary to plant 300,000 acres of conifers if the country is to become independent of imports. The present policy provides for the establishment of 8,000 acres per year.

New Zealand.

New Zealand, unlike South Africa, which imports both hardwoods and softwoods, shows an excess of softwood exports over imports. The softwood resources are, however, nearing exhaustion, and there are little prospects of the natural regeneration of these forests providing more than a small percentage of the future softwood requirements. Exotic conifers, which grow more rapidly than the indigenous species, are therefore planted on a large scale. The afforestation policy adopted by the State in 1896 has resulted in the planting of some 60,000 acres to the present date. The State has rightly, however, planted mainly species requiring a rotation up to forty years or more. Eucalypts occupy only 7 per cent. of the area, with softwoods covering 73 per cent., only 8 per cent. of which consists of the inferior Pinus radiata (or insignis). Two County Councils have planted extensive areas—Selwyn having 7,000 acres of established plantations and Ashburton 4,500 acres. Other Councils and private companies are operating in a smaller way, whilst a larger company proposes to operate on a large scale.

Australia.

Returning to Australia, we find the position equally serious, but less is being done to meet the situation. Australia is fortunately placed with regard to hardwood forests, and granted the general rules of forest management are applied to the eucalypt forests, there will be no shortage of hardwoods. The natural regeneration of the existing hardwood forests, assisted in certain cases by plantations, will provide for future requirements.

In the case of softwoods, however, the situation is different. Australia imported softwoods in 1920-21 exceeding £5,000,000 in value. She will require more in the future, owing to development of industry, increasing population, and administering home supplies. The world's supplies of over-mature softwoods are being rapidly depleted. The rate of utilisation greatly exceeds the rate of increment. In thirty years' time little softwood will be exported from Canada, United States of America, and Scandinavia. The softwood resources of Australia are very small. Queensland alone can almost supply her requirements, but when the over-mature pine is removed the increment of the undergirth pine will supply but a small percentage of her

demands. There is only one solution—plantations of softwood. The natural regeneration of the present pine forests in Queensland will prove costly, if possible and, even if successful, the consequent increment will supply but a small part of the State's requirements. *Queensland requires 5,000 acres per annum to meet her minimum requirements in the future.*

Conclusion.

To the tourist, who has no interest in forestry, there is nothing more picturesque on the Continent, and in Germany in particular, than the beautiful forests which surround the majority of the towns and villages. These forests are, as a rule, owned by the community. Forty per cent. of the total forest area of Hesse Darmstadt and 46 per cent. of Baden consists of communal forests. Of 1,350 towns and villages in Hesse Darmstadt 722 possess forests, the average area of which is 330 acres. These town forests not only add greatly to the beauty of the town and its environments, purify the atmosphere and afford free recreation grounds, but assist a great deal in reducing taxes.

The gross income of the communal forests of Hesse Darmstadt in 1911 was £250,000. Some communities are so fortunately situated that, after the returns from the communal forests have paid the income tax, a credit balance remains. Moreover, labour is required for the forests in the winter time when unemployment is prevalent. Finally, it is considered that one of the chief values of such a forest lies in the fact that it prevents speculators from buying up land around the town as an investment. There are few more beautiful cities than Gympie, if any, in Australia. By virtue of its situation and surroundings it possesses a natural beauty which it will always retain. But could a town forest be created to cover the vacant land around the town and hide the unsightly mullock heaps, the beauty of the town would be enhanced, and I would urge the Town Council of Gympie and other municipal centres to give this proposal serious consideration.

POULTRY IN LONDON—A TRIAL SHIPMENT.

The New South Wales Minister for Agriculture (Mr. Chaffey) has received through the Agent-General a report from Messrs. Sproat and Co., of Smithfield, London, on the 300 pairs of chickens shipped from Sydney last January.

After commending the way in which the birds were graded and packed, Messrs. Sproat and Co. pointed out that, as the chickens are required as a substitute for either petits poussins or English spring chickens, the sizes should range from 1 to 2 lb. This size should suit local breeders, as it is recommended that the birds shall be shipped during November and December, just when breeders are becoming pushed for room and the glut of small-sized birds is setting in.

The report compares the Black Orpington with the other chickens (White Leghorn), and says that the "Blacks" were of good quality, but too dark in appearance, and recommends white-fleshed milk-fed birds. Messrs. Sproat and Co. consider that the financial results from the latter would well repay for the extra preparation.

It is mentioned that the birds should be killed by bleeding, instead of dislocation of the neck. This was understood here, but difficulty was met with in getting them killed in this way. Fifteen and a-half pairs of the birds are reported as bruised in the killing, and in consequence were sold at 2s. per pair. After stating the table birds of the larger class (weighing 3½ lb. and upwards) would meet with ready sale, it is pointed out that in this larger class White Leghorns would not be suitable.

The report adds that there is a fair prospect for the chickens of 1 to 2 lb. weight if the suggestions are carried out. Market rates for this class of chickens at the time were 2s. 6d. to 3s. 6d. per pair. The net result, after expenses, is 3s per pair for the birds other than those reported as bruised.

In comparing this with the market price at the time, it should be borne in mind that the average of 2s. 6d. and 3s. 6d. per pair would be 3s., but, as it costs 6d. per pair to market them locally, there appears a gain of 6d. per pair.

EGG-LAYING COMPETITIONS.

MOUNT GRAVATT.

During May the laying was very satisfactory, an average of 15.8 eggs per bird. Two deaths occurred—C bird of Mrs. Hutton's White Leghorns and D bird of Messrs. Hindes's Black Orpingtons.

Individual scores:—

SECTION 1.

White Leghorns.

Name.	A.	B.	C.	D.	E.	F.	Total.
W. E. Woodward..	44	40	48	31	37	28	228
B. Driver	39	27	45	33	38	43	225
E. J. Stilton	44	38	36	38	43	19	218
John J. McLachlan	41	38	36	37	38	26	216
Eclipse Poultry Farm	48	42	36	37	43	3	209
W. and G. W. Hindes	34	40	35	31	33	32	205
Mrs. R. E. Hodge	34	28	29	44	25	39	199
J. Harrington	29	27	32	37	33	35	193
W. Wakefield	37	37	20	39	34	19	186
J. Hutton	33	28	26	14	36	45	182
M. F. Marsden	36	21	24	18	40	42	181
J. E. G. Parnell	30	22	35	38	25	28	178
R. C. J. Turner	34	31	48	34	16	35	178
Jas. Earl	40	39	9	31	22	34	175
L. Bird	43	29	3	23	45	25	168
G. W. Cox	29	23	25	29	28	21	155
M. F. Newbury	19	32	35	37	10	21	154
E. Anderson	9	31	15	20	37	40	152
S. L. Grenier	38	28	39	4	20	22	151
H. Fraser	10	28	36	25	22	10	131
Mrs. H. P. Clarke	9	28	25	31	30	7	130
A. S. Walters	22	34	9	19	8	35	127
T. W. Honeywill	21	1	38	18	29	18	125
H. P. Clarke	3	33	5	10	36	31	118
Chris. A. Goos	33	3	20	24	..	24	104
George Marks	15	28	20	3	32	6	104
T. H. Craig..	5	27	17	32	3	16	100
W. D. Melrose	24	37	4	..	15	15	95
Mrs. C. Lindley	4	6	9	35	8	13	75

SECTION 2.

Black Orpingtons (except where stated).

Name.	A.	B.	C.	D.	E.	F.	Total.
Eclipse Poultry Farm	37	38	48	35	33	29	220
J. Potter	47	22	36	32	41	41	219
H. Cutcliffe..	45	29	31	25	34	30	194
W. and G. W. Hindes	50	15	18	26	29	44	182
E. Walters..	25	27	17	33	40	34	176
G. E. Rodgers	10	33	38	27	39	27	174
E. W. Ward	22	27	34	30	31	29	173
Thos. Hindley	38	21	40	7	39	11	156
Carinya Poultry Farm	33	32	5	20	37	16	143
J. Pryde (R.I. Reds)	4	35	11	36	22	29	137
J. Hutton	37	7	37	38	1	16	136
R. Burns	28	16	9	23	42	15	133
Mrs. A. E. Gallagher	14	22	29	6	15	33	118
C. Dennis	20	14	29	19	16	19	117
W. D. Melrose	2	25	24	34	26	1	112
E. C. Stead (Wyandottes) ..	..	3	..	..	25	..	28

N.U.P.B.A.—TOOWOOMBA SUB-BRANCH.

Single Test Egg-laying Competition—Scores to 31st May, 1925.

WHITE LEGHORNS.

Pen No.	Name.	May.	Total.	Pen No.	Name.	May.	Total.
42	Dipple, D. H. ..	22	46	23	Everlay P.F. ..	25	27
41	Dipple, D. H. ..	21	45	38	Fallon, P. J. ..	13	27
8	Wagner, H. S. ..	23	44	58	Chapman, S. ..	20	27
11	Hutton, Jas. ..	24	44	62	Goggins, J. ..	21	27
40	Cole, R. C. ..	22	43	36	Turner, R. C. J. ..	12	26
29	Jones, J. H. ..	25	42	57	Chapman, S. ..	22	26
21	Rogers, G. E. ..	22	40	45	Frawley, M. J. ..	11	22
50	Keena, C. A. ..	21	40	1	Taylor, Jas. ..	21	21
60	Murphy, M. ..	19	40	61	Goggins, J. ..	14	21
14	King, J. E. ..	20	39	22	Rogers, G. E. ..	17	19
39	Cole, R. C. ..	20	39	20	Dibbs, C. H. ..	12	17
54	Howe, E. W. ..	21	39	44	Sharkey, S. B. V. ..	11	17
7	Wagner, H. S. ..	17	38	56	Dalheimer ..	14	17
27	Short, J. W. ..	20	37	59	Murphy, M. ..	11	17
35	Turner, R. C. J. ..	18	37	4	Parker, E. ..	15	16
48	Stilton, G. ..	19	37	10	Horne, A. C. ..	5	16
52	Howard, R. B. ..	23	36	37	Fallon, P. J. ..	5	15
9	Horne, A. C. ..	24	35	30	Jones, J. H. ..	8	13
43	Sharkey, S. W. V. ..	22	34	51	Howard, R. B. ..	13	13
53	Howe, E. W. ..	21	34	3	Parker, E. ..	9	12
28	Short, J. W. ..	13	33	12	Hutton, Jas. ..	3	12
17	Williams, W. D. ..	18	32	13	King, J. E. ..	4	11
26	Harper, W. C. ..	19	32	34	Manning, H. G. ..	2	8
32	Newport ..	20	32	15	Grant, W. ..	5	5
33	Manning, H. ..	23	32	55	Dalheimer ..	0	4
19	Dibbs, H. ..	18	31	18	Williams, W. D. ..	1	4
24	Everlay P.F. ..	20	30	6	Maurer, G. ..	2	4
47	Stilton, G. ..	12	30	25	Harper, W. G. ..	2	2
46	Frawley, M. J. ..	12	19	31	Newport, J. ..	0	0
2	Taylor, J. ..	10	28	15	Grant, W. ..	0	0
49	Keen, C. A. ..	16	28	5	Maurer, G. ..	0	0

BLACK ORPINGTONS.

130	Neul, R. ..	27	52	125	Stephens, H. B. ..	16	24
117	Hindley, T. ..	28	48	114	Williams, D. W. ..	17	24
131	Rogers, G. E. ..	28	47	123	Hopkins, P. ..	0	22
132	Rogers, G. E. ..	25	46	129	Neil, R. ..	21	22
128	Short, J. W. ..	24	46	102	Carr, T. J. ..	14	21
120	Hutton, Jas. ..	24	45	109	McBean, S. ..	19	20
107	Graham, C. ..	19	44	113	Williams, W. D. ..	7	20
89	Le Pla, A. W. ..	22	44	96	Burns, R. ..	0	19
121	Brock, E. W. ..	23	43	122	Brock, E. W. ..	17	18
116	Everlay P.F. ..	25	43	88	Head, J. ..	17	17
106	Maund, L. ..	21	43	91	McFarlane, K. ..	17	17
99	Petty, A. R. ..	25	42	85	Kelly, — ..	9	16
119	Hutton, Jas. ..	22	42	115	Everlay P.F. ..	12	12
105	Maund, L. ..	20	40	104	Adams, W. S. ..	5	8
98	Rye, V. J. ..	18	39	118	Hindly, T. ..	5	7
108	Graham, C. ..	24	36	83	Wilson, W. R. ..	6	6
100	Petty, A. R. ..	23	36	86	Kelly, — ..	6	6
111	Walters, A. E. ..	18	33	126	Stephens, H. B. ..	5	5
112	Walters, A. E. ..	18	33	101	Carr, T. J. ..	1	5
97	Rye, V. J. ..	22	30	92	McFarlane, K. ..	4	4
127	Short, J. W. ..	29	29	84	Wilson, W. R. ..	2	4
124	Hopkins, P. ..	4	26	103	Adams, S. ..	0	3
95	Burns, R. ..	17	26	87	Head, J. ..	1	1
93	Ollier, T. C. ..	13	26	110	McBean, S. ..	0	0
90	Le Pla, A. W. ..	6	25	94	Ollier, T. C. ..	0	0

N.U.P.B.A.—TOOWOOMBA SUB-BRANCH—*continued.*

OTHER VARIETIES.

Pen No.	Name.	May.	Total.
80	Everlay P.F. (W. W'dotte) ..	24	36
71	Dibbs, H. (Lang.) ..	25	36
77	Maund, L. (Col. W'dotte) ..	18	32
75	Badcock, — (R.I. Red) ..	16	28
64	Chapman, S. (B.L.)	11	22
73	Le Pla, A. W. (R.I. Red) ..	2	18
63	Chapman, S. (B.L.)	12	17
79	Everlay P.F. (W. W'dotte) ..	11	17
74	Le Pla, A. W. (R.I. Red) ..	6	14
76	Badcock, — (R.I. Red) ..	3	12
78	Maund, L. (Col. W'dotte) ..	12	12
82	Brand, V. (B.L.) ..	7	9
66	O'Connor, K., Mrs. (B.L.) ..	7	7
65	O'Connor, K., Mrs. (B.L.) ..	6	6
67	Parker, E. (B.L.) ..	0	3
68	Parker, E. (B.L.) ..	0	3
81	Brand, V. (B.L.) ..	2	2
72	Dibbs, H. (Lang.)	1	1
69	Badcock, — (Lang.)	0	0
70	Badcock, — (Lang.)	0	0

JOSEPH GARNER, Government Supervisor.

SILOS AND SILAGE.

BY A. E. GIBSON, Instructor in Agriculture.

In a recent letter directed to the Department of Agriculture and Stock, on the subject of silos and silage, the correspondent mentioned that he had taken considerable interest for some time past on subjects likely to benefit the man on the land, and incidentally matters relating to silage; but mentioned that certain items which have occurred to him have either been insufficiently dealt with or totally ignored. Consequently, with a view of clearing up the several matters in connection with silos and silage on which he desires information, the following questions submitted by him are dealt with seriatim:—

Question 1.—What is the best form of silo?

Answer.—A properly roofed and watertight cylindrical structure of reinforced concrete built overground and having an internal shute for emptying purposes in preference to doors.

Question 2.—Which is the better plan? Having the height greater than the diameter or *vice versâ*?

Answer.—Silage rapidly depreciates when exposed to the atmosphere; consequently in order to reduce surface exposure to a minimum the diameters of silos are reduced as much as possible, whilst the height is increased in order to give a greater pressure to the silage for the purpose of compaction and consequent exclusion of air from the silage. Usually the proportion of height to diameter is 2 to 1 respectively, and is found to be economically preferable to those in which the height compared to the diameter is at a higher ratio, say, 2½ or 3 to 1.

Silos which are excessively high require greater strength in foundations and walls, apart from which higher power and more expensive machinery is necessary for the filling.

Question 3.—Or is there any specific proportion between diameter and height?

Answer.—This question is really answered under Answer 2, but, whilst there is no distinct or specific proportion between diameter and height, it must be clearly understood that as the diameter increases to the ratio of the height so is the density of the silage decreased unless some form of artificial pressure is used.

Question 4.—Which is the best silo? Above ground level, below ground level, or half and half?

Answer.—Although it is admitted that the filling of a pit or underground silo is extremely economical and can be effected with a minimum amount of machinery and labour, the process of emptying the silage therefrom is the most costly and strenuous of all forms of silos. The overhead silo, whilst requiring a little more power and machinery for the filling, is the most economical of all when it comes to the operation of emptying. The silo which is half above and half below ground level has all the drawbacks of the pit and overhead silo, whilst only possessed of half the benefits of the latter.

Briefly, the merits of the three silos may be summed up as follows:—

Pit Silo.—Economical in filling, expensive in emptying (it requires the services of two operatives to empty a pit silo).

Overhead.—Slightly more expensive, due to increased power and machinery in the process of filling, but is decidedly economical in the process of emptying.

Half aboveground.—Costs practically the same to fill as an ordinary overhead silo, and is as cheap to empty down to ground level. From that on the cost of emptying becomes greater with the depth below surface.

Question 5.—Give dimensions for building a 50-ton silo.

Answer.—Silo internal diameter 11 ft. 6 in.; height, 23 ft. 3 in.

Question 6.—Give quantities for making same.

Answer.—For a 50-ton silo, using a 4-2-1 mixture—*i.e.*, four parts of broken stone, two of sharp sand, and one of cement—you would require:—Cement, 70 bags; stone aggregate (¾-in. gauge), 14 2/5 cubic yards; sharp sand, 8 cubic yards; reinforcement, 2 coils 36-in. K-Wire netting, 10 gauge; rendering, 1 in. inside and out, 2½ cubic yards sand; 36 bags cement. Roof specifications depend on style adopted (gable or octagon).

Question 7.—How would you work out the necessary information from Answers 5 and 6 to enable one to build (*a*) larger silo, (*b*) a smaller silo?

Answer.—Diameter $2 \times .7854 \times$ height $\div 48 =$ tons capacity. Diameter $\times 3\,1/7 \times$ height $\times$ thickness of wall in feet $\div 27 =$ cubic yards contents of wall.

Based on the proportions of 4-2-1—*i.e.*, four of stone, two of sand, one of cement. To each cubic yard of concrete 540 lb. of cement are required (4⅓ bags). Of aggregate (stone) broken to gauge (in this instance ¾ in.) nine-tenths of one cubic yard are required and ½ cubic yard of sharp sand.

The cement and sand together do not appreciably increase the bulk of the concrete, as they fill up the interstices in the aggregate.

Rendering (inside and out) is calculated at 2 to 1 (2 of sand and 1 of cement). This will give a sufficiently watertight job without the addition of water-proofing material.

Question 8.—What acreage of maize will fill a 50-ton silo?

Answer.—This, of course, depends on the crop; also the manner in which it was sown—*i.e.*, broadcast or drilled. Under ordinary circumstances the quantity required should be easily obtained by the cultivation of 5 acres of maize sown in drills—which method is recommended at all times in preference to sowing broadcast.

Question 9.—How is a silo filled?

Answer.—By a power-driven elevator of a similar pattern to that used on chaff or grain elevators, slats of timber being substituted for cups, or by blower—the latter being simply a fan blast driven at a high rate of speed with delivery pipes of 6 in. and upwards led directly into the silo at the top. More power is required to a "blower" than an elevator. Whatever system is adopted for the purpose of conveying the chaffed green material from the chaff or silage cutter to the silo must make provision for its equal distribution. Where chaffed maize is indiscriminately fed into a silo, the tendency will be found for the heavier (stalk) portions to lodge in the centre, whilst the lighter (leafy) class of material accumulates around the walls.

Unless this is thoroughly incorporated with the heavier class of fodder in the subsequent fermentation which takes place, uneven settlement results. The centre, by reason of its greater solidity, does not settle to the same extent as the outside or lighter material; consequently a shrinkage from the walls occurs, admitting air, which, once fermentation has lessened, brings about a gradual decay of all the exposed surfaces of the silage.

To overcome this, all material fed into silos must be evenly incorporated and tramped tightly along the walls, and around all doors of internal chutes. To do this thoroughly necessitates the presence of a competent and reliable operative in the silo during entire filling operations. Note that all doors that come in contact with the silage must be rendered airtight. This can be effected by covering them with tarred brown paper.

Although the question was not asked by the correspondent, it is thought that a few points on emptying will not be amiss.

When emptying use a strong-toothed rake, and rake evenly from the top the amount of silage required for the daily ration. At all times avoid digging into the bulk of the silage. Remember that the more even and level the surface of the silage is left after each daily ration is obtained, the less decomposition and consequent waste will occur. If your silo has doors fitted to it, keep them closed; there is then less strain on the hinges and the doors (which are weighty) would fit more snugly when refilling, apart from which there will be no chance of rain destroying the silage, for nothing tends to bring about the decomposition of silage quicker than the admission of either air or water.

THE AUSTRALIAN STUD PIG BREEDERS' SOCIETY.

NOTES ON ITS ACTIVITIES.

E. J. SHELTON, Instructor in Pig Raising.

As far back as the years 1900 to 1910 breeders of stud pigs throughout Australia realised the desirability of establishing a Stud Pig Breeders' Society to control their interests and to publish a Herd Book, but it was not until the year 1910 that a definite move was made in this direction. During that year a society known as the Berkshire and Yorkshire Society of Australasia was founded, with Victorian breeders as its executive, and with offices in Melbourne. The society published its first Herd Book during 1911, the editor being the first secretary of the society, Mr. Arthur Beale, a gentleman now known favourably by the whole of the breeders of stud pigs throughout the Commonwealth. Mr. Beale piloted the society through many difficult stages, and it is to his untiring efforts that the ultimate success of the society is attributed.

The first Herd Book contained the registered pedigrees of 217 Berkshires and 192 Yorkshires (practically all Middle Yorks), the pedigrees and verifications being compiled from old records that existed through the Royal Agricultural Society of Victoria. It is worthy of note that, in the year 1911, out of a total membership of sixty-six breeders all were Victorians, with one exception, that veteran old breeder, Mr. Luke Williams, of "Claremont," Moonah, Tasmania.

The first Queenslander to join the society was Mr. C. H. Grove, of Kelvin Grove, Nanango, whose membership records date back to 1912. During the following year Mr. W. J. Warburton, of Northgate Junction, became a member and had a number of pigs registered.

Interstate representatives were elected by the society in the year 1914, Queensland then being represented by the assistant secretary of the Royal National Agricultural Association. It was during 1914 also that the first entries of Tamworth pigs were accepted for registration. The following year the breeders of British Large Black pigs joined up and had their animals recorded, whilst in 1916 the Poland-China enthusiasts also added their support.

The present secretary, Mr. R. G. Watson, was elected in 1922, and it was through his efforts that the first meeting of the members of the society resident in this State was called, this meeting being held during the currency of the Royal National Show, 1922.

At this meeting it was resolved to apply to the main body in Melbourne for representation in the conduct of the affairs of the society, and Mr. Watson was deputed to attend the annual general meeting in the Southern State to forward Queensland interests. It was at this latter meeting that the constitution of the society was rearranged to allow of each State having its own representatives. A Federal General Council was also elected as the permanent administrative body.

Objects and Methods of the Society.

The principal objects of the society are:—

(*a*) To maintain the purity and promote the improvement of all recognised pure breeds of pigs in Australia.

(*b*) To collect, verify, preserve, and publish a Herd Book with the pedigrees of the abovementioned pigs and other useful information concerning them.

(*c*) To investigate suspicious or doubtful pedigrees of pigs and other alleged misrepresentations relating to them and to publish the results of such investigations at the discretion of the Federal Council.

(*d*) To increase the educational value of agricultural shows and to encourage the exhibition of representative and typical animals of the various pure breeds of pigs by offering trophies or cash prizes for competition thereat, and endeavouring to have competition limited to registered pigs and the exhibits judged by competent judges included in an official panel drawn up and published by the society.

(*e*) To promote fellowship amongst the pig-breeders of Australia and to further their mutual interests generally in so far as the breeding of stud pigs is concerned.

(*f*) To establish relations and encourage exchanges with other societies having similar objects throughout the world.

(*g*) To do all such other lawful things as are incidental to the attainment of the above objects.

In 1924 new rules were adopted placing certain rights and duties on branches with their representation on the basis of membership; thus it is that Queensland

now has one representative member on this Federal General Council. Each State now has its own executive for the conduct of its own affairs. The name of the society was also altered to "The Australian Stud Pig Breeders' Society."

Duroc-Jersey and Gloucester Old Spot pigs were accepted for registration in 1925, the former being entered by a Queensland breeder, and now, after an elapse of several years, Large Black pedigrees again find a place in our records.

Up to the issue of the Herd Book, Volume 15, in 1925, the registrations accepted numbered—Berkshires, 6,180; Yorkshires, 2,992; Tamworths, 405; Poland-Chinas, 164; British Large Blacks, 38; Duroc-Jerseys, 7; Gloucester Old Spots, 4.

On the first day of January, 1925, the following new rules governing registration came into operation:—

Rule 51.—All applications for registration must be made on printed forms supplied by the society and lodged, together with the prescribed fees, with the secretary of the branch in the State in which the entrant resides. When the entries are in order the branch secretary will forward them to the Federal secretary, who will record the registrations and allot the Herd Book numbers. If the Federal secretary should question the eligibility of any animal submitted for registration, the matter shall be referred to the Federal Council. The onus shall rest with the entrant in all cases of satisfying the Federal Council of the undoubted purity of animals submitted for registration and as to the correctness of any additional information required, and the Federal Council shall have discretionary power to accept or reject any pedigree without giving any reason for so doing.

Rule 52.—Every member shall be required to register a separate stud prefix for his exclusive use in connection with the names of animals bred by him. (Fee 10s. 6d.)

Rule 56.—The name and address of the breeder of each animal must be given. The breeder of an animal is the owner of its dam at date of farrowing.

Rule 57.—The sire and dam of each animal submitted for registration must be already registered in the society's Herd Book or in a Herd Book recognised by the society, or applications for the registration of sire and dam must be accepted before the registration of such animal can be considered. The fee for the registration of each animal shall be 7s. 6d.

Rule 58.—On and after 1st January, 1925, it shall be compulsory for every breeder to record the date of farrowing of each litter from registered sows, giving particulars as to the number of each sex living and dead, such notification to be given on forms supplied by the society and to be furnished to the branch secretary within twenty-one days of the farrowing of the litter. (Fee 1s.)

Rule 59.—No boar or sow born on or after 1st January, 1925, will be accepted for registration, except at the discretion of the Federal Council, unless it is from a notified litter and is submitted for full registration before it is fifteen months old.

Rule 60.—It shall be compulsory for the vendor to officially transfer every registered boar or sow sold on or after 1st January, 1925, also every animal sold out of a notified litter. Such transfers must be made on the society's official forms and be lodged with the branch secretary within sixty days from date of sale, together with a fee of 1s.

Rule 62.—The prefix "champion" may be put in front of the name of any animal after it has won at Royal Shows two championships in one State and one championship in another State.

Rule 63.—All deaths of eligible stock owned by members must be registered within sixty days of death. (No fee.)

Rule 64.—The purchaser of a stud shall have no right to the previous owner's stud prefix except with the sanction of the previous owner and with the approval of the Federal Council.

Rule 65.—It shall be the duty of all members to keep proper records of their stud-breeding activities, such records to be open for inspection by any person appointed by any branch and approved by the Federal Council.

It will be observed that several of these new rules provide a distinct check on breeding and age.

Inter-society Co-operation.

The society is now co-operating with various Agricultural Show Societies with a view to forwarding the interests of stud pig breeders and of the pig industry in general. It is also constantly in touch with the British Berkshire Society and the National Pig Breeders' Society of England, and other overseas pig breeders' associations, and is at present co-operating with the Department of Agriculture and Stock, Brisbane, in endeavouring to make arrangements for the importation of fresh strains of stud pigs from England.

Membership.

In 1922 Queensland had only five financial members of the society. To-day there are twenty-six members on the roll, all active breeders who take an interest in the affairs of the society. These breeders realise the importance of the work being done and appreciate the status it gives them as breeders of pure-bred pigs.

The hon. secretary's address is Inns of Court, Adelaide street, Brisbane, and he will be pleased to assist prospective members with any information to enable them to become breeders of pure-bred pigs, while the Instructor in Pig Raising, Department of Agriculture and Stock, stands prepared to assist breeders also.

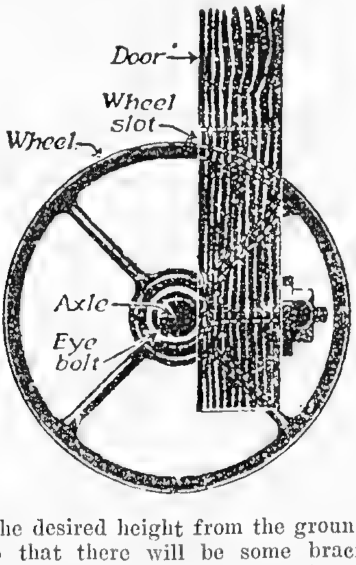
The office-bearers in Queensland are:—Committee: J. H. Whittaker, Broxburn Stud, Darling Downs (chairman); W. J. Warburton, Northgate Stud, Brisbane; J. W. Handley, Bonvale Stud, Murphy's Creek; E. J. Shelton, Instructor in Pig Raising, Brisbane; R. G. Watson, Inns of Court, Brisbane. Hon. secretary and treasurer and representative on Federal General Council, R. G. Watson, Inns of Court, Adelaide street, Brisbane.

The Queensland members are:—Jos. Ashford, Ashley Stud, Curra; C. Behrendorff, Inavale Stud, Bunjurgen, *viâ* Boonah; Brown Bros., Mooroombin Stud, Toogoolawah; E. Burton, Oxford Stud, Wanora; P. V. Campbell, Lawnhill Stud, Lamington; Dr. F. Glynn Connolly, Wilton Stud, Wellcamp; The Benevolent Asylum, Dunwich; J. C. Davey, Abbeystead, Gatton; P. P. Falt, Ryfield Stud, Tingoora; W. H. Foote, Rockton Stud, Harrisville Line; A. Haly, Wadhurst Stud, Radford; J. W. Handley, Bonvale Stud, Murphy's Creek; Hospital for Insane, Goodna; J. S. Jacobsen, Louisiana Stud, Mount Larcom; Jack Lawrence, Elton Stud, Peeramon; J. Naylor, View Farm Stud, Cambooya; M. Porter and Son, Roseloch Stud, Wondai; Queensland Agricultural High School and College, Gatton; State Farm, Hermitage; State Farm, Kairi; State Farm, Warren; F. Wallison, Kunioon Stud, South Nanango; W. J. Warburton, Northgate Stud, Northgate; R. G. Watson, Inns of Court, Brisbane; J. H. Whittaker, Broxburn Stud, Broxburn; W. C. Zerner, Cooroy Stud, Cooroy.

Membership forms and all other information may be obtained from the secretary at any time.

SUPPORTING SWINGING DOORS.

Wide, heavy swinging doors have a way of sagging to the ground and becoming hard to open and close. Procure a light wheel, twelve or fifteen inches in diameter and having a fairly wide tyre. Cut a slot at the lower edge of the door, and near its outer end, large enough to accommodate the wheel and give it fairly free play.



Block up the door to the desired height from the ground. Fit the wheel with an axle of proper length, so that there will be some bracing strength beyond the eyebolts, one on each side of the wheel, with which it is attached to the door. Roll the wheel into position and assemble as shown. This is the best means for handling wide doors satisfactorily.

THE FRUIT FLY.

REPORT ON MEASURES OF POSSIBLE CONTROL, 1924-25.

By H. JARVIS, Entomologist, Stanthorpe.

FRUIT FLY—*Chaetodacus tryoni.*

The Control Measures.

Special efforts were made this season, 1924-25, by the Department of Agriculture and Stock to control the fruit fly, *Chætodacus tryoni* Froggatt, in the Stanthorpe district.

These endeavours embraced the following procedures:—

1. The interruption of the alleged continuous persistence locally of the fruit fly as a pupa in the soil.
2. The enforcing (by an increased inspectorial staff) of the picking up and destruction of all fallen or infected fruit in every orchard.
3. The cold storage of and embargo on unrestricted importation, and check-inspection at Warwick, of every case of fruit consigned to the Stanthorpe district.
4. The destruction of the adult fruit flies by means of traps baited with "Harvey's Lure."

1. Clearance Out of Fruit Fly by 7th April, 1924.

It having been stated that "The origin of the fruit fly each season was bound up with the hibernation of the pupa in the district," the Department of Agriculture secured, on 1st March, 1924, a Proclamation of a special Regulation, under "*The Diseases in Plants Act*, 1916," compelling all fruit (except grapes and tomatoes) to be sent out of the Granite Belt district by 7th April, as a measure for ensuring the prevention of the occurrence of the fruit fly within that area in the spring.

In an official report at this time I stated that I could not support this Regulation in its relation to fruit fly control, as all my experiments had up to this time indicated that the fruit fly did not winter as a pupa in the Granite Belt district.

This Regulation was enforced with great thoroughness, fifteen temporary inspectors being added to the staff for that special purpose.

The fruitgrowing area was, accordingly, "cleaned up" on or before the date mentioned.

However, "fruit fly" appeared by the second week in November all through the district, and by the end of the month much of the early fruit was "fly-stung" as in earlier years.

The Department, meanwhile, was carrying out experiments to test this fact of hibernation (a presumed fact, certified to on very slight evidence). There were placed out in various orchards large quantities of maggots and pupæ, in various situations, both sheltered from frosts and otherwise; and they in each case were kept covered in with fly-proof frames. In some cases the fruit harbouring maggots was buried a few inches under the soil, and in other cases it was just placed on the surface; pupæ were also buried at various depths from 1 to 12 inches.

Result.—Fruit flies failed to occur in any of these cages at the date for their usual appearance, or at any time subsequently. This, of course, is only negative evidence. However, there has been no requisition for the renewal of this Regulation this April. [The Department of Agriculture is now prosecuting a final test bearing on this over-wintering question, in two cages erected over fruiting trees. These cages are ample ones, being 8 feet long, 6 feet wide, and 6 feet high. At least 4 cwt. of maggot-infested fruit is now placed on the ground in each of the cages. This fruit harbours every stage of living fruit fly maggot and should prove a conclusive test of the hibernation or otherwise of the pupa in the district. In view of the possibility of the over-wintering of the adult fruit fly, rolled sheets of woolly bark tied tightly at the top have been placed in these cages, one end each of these bark shelters rests in the soil and the other end is supported by the branches of the tree. Fruit flies will thus be enabled to find shelter, secure from all frost and cold winds and thus survive the winter, if it be usual with them to do so. I am greatly indebted to Mr. J. W. Barlow, of Applethorpe, he having kindly placed two of his trees at my disposal, and given me otherwise very great assistance in this experiment.

(*Note.*—It is also hoped with some foundation that these cages will prove invaluable in the forthcoming season in supplying other data, not already secured, relating to fruit fly, and also in testing lures (under control conditions), repellents, &c.)]

2. The Gathering and Destruction of Fallen and Infected Fruit.

A special effort was made to enforce this (the most important means of local fruit fly control hitherto favoured). On the recommendation of Professor E. J. Goddard six additional temporary inspectors, under the Diseases in Plants Act, were added to the six already on the permanent staff, thus making twelve in all. These temporary inspectors commenced duty on 17th November, and completed it on 4th April, the systematic inspection of every orchard at frequent intervals thus being made possible. This work was directed by the Chief Inspector, Mr. T. W. Lowry, and was undoubtedly of the greatest assistance in preventing to some extent the local increase of fruit fly, and in accounting for its comparative absence during the months of December, February, and March. Throughout the district the large majority of orchardists enjoyed more freedom from "fly" than was the case last year. There were, however, a few orchards on which the fly was fairly plentiful and active all through the season. At the end of it what seemed to be a wave or army of flies appeared suddenly in almost all orchards at the same time, totally destroying late peaches and apples, irrespective of the use of traps and lures or repellants. *Vide* "Influence of Season" (meteorological p. 52).

(*a*) *Difficulties attaching to this proceeding.*—In so large an undertaking as that involved in the frequent inspection of 700 or 800 orchards, it is difficult to account for the destruction of every individual maggot-infested fruit; hence a small leakage is unavoidable.

The principal causes of such leakage are:—(i.) The overlooking when picking of one or perhaps two fruits—leaving them on a tree. (ii.) The presence of weeds and grass in the orchard under the trees, making it possible, and, in fact, easy to miss individual fruits when gathering windfalls, &c. Both these happenings are responsible for a good number of fruit flies being bred in the district, more especially towards the latter end of the season.

(*Note.*—The extent to which the fruit flies (so bred) are responsible for fresh local infestation is a point not yet ascertained. It is, of course, quite possible, and in my opinion, probable, that these locally-bred flies are not ready to oviposit even perhaps, say, for many weeks. It is hoped that definite information on this point will be secured next season.)

(*b*) *Efficiency in inspection.*—The systematic inspection of orchards carried out this season has been a difficult undertaking requiring great tact and industry; and credit is due to the Chief Inspector, Mr. T. W. Lowry, and also to every member of his staff for the manner in which they have carried out the work.

The majority of orchardists in the district have willingly complied with the regulations this season, realising that the Inspector was their best friend.

When once the importance of this unremitting cleanliness from the beginning to the end of the season is realised fully by all orchardists, frequent visits from an inspector should be unnecessary.

3. The Cold Storage Embargo and Check-Inspection at Warwick.

The check-inspection at Warwick (by Inspector C. G. Williams) of all fruit consigned to the Stanthorpe district, combined with the added precaution of subjecting such fruits to a cold storage temperature prior to their being despatched from Brisbane, has undoubtedly proved an important means of preventing a large number of living fruit fly maggots and puparia from being imported, as happened before the above precautionary measures were instituted, in the Stanthorpe area.

(*Note.*—*Uncontrolled entry of fruit fly.* I consider, however, that the most important factor contributing to our annual fruit fly infestation is the migration or immigration of the adult fly into this district from outside areas of Queensland, and possibly of New South Wales also. This possibility was recognised and pointed out by me in my earlier reports and is one now, I believe, generally accepted.)

4. Destruction of the Adult Fruit Fly by Trapping with "Harvey's Lure."

With a view to controlling the fruit fly, a special effort was made this season to distribute, at a more reasonable cost than hitherto, both glass fruit fly traps and also "Harvey's Lure."

Owing to this lure being considered efficient by Professor E. J. Goddard, suggested conclusive local tests (of its efficiency or otherwise) on a large scale recommended by this office were postponed.

I understand, however, that a number of tests were carried out with "Harvey's Lure" by Mr. A. T. Perkins, B.Sc., University Research Fellow, and that a very large number of fruit flies were trapped.

One test only was carried out by me with "Harvey's Lure." This was at the orchard of Mr. J. Smith, of Applethorpe. In it twenty "Granny Smith" apple-trees were chosen, each carrying a good crop of fruit; moreover, special care was exercised to ascertain that, at the time of setting the traps, none of this fruit had been already stung. One trap containing lure was placed in each tree, and this lure was renewed twice weekly. The lure used was that known as "Brew 5." Result, thirty-six flies were caught up to 1st March, when it was realised that, notwithstanding the presence of the traps and lure, all the apples were becoming badly stung. The main crop was accordingly gathered, one tree alone being left with a trap still set in it; but, in spite of the presence of this trap, every apple on this tree was badly stung also.

It will be seen, from the above experiment, that the placing of one trap baited with "Harvey's Lure" in a fruiting tree will apparently not prevent the fruit from being "stung."

The Chief Inspector, Stanthorpe district, Mr. T. W. Lowry, recently furnished each inspector under him with forms, one to be filled in by each orchardist, stating particulars *re*—(1) The use, or otherwise, this season of traps, lure, &c., and (2) the results in marketing, &c. These, that constitute most interesting reports, have now come to hand. It is shown by their reports, that about 50 per cent. of the orchardists used traps and lure this season; a few, systematically right through it, others just one or two traps at the beginning of the season. The remaining 50 per cent. of orchardists used no lure or traps. Some (very few) of these used repellents: Carbolacene (recommended by this office as "worth trying"). A few again used poison bait sprays. It is also evident, from these reports, that those using "lure," and those, not using "lure," shared the same comparative freedom from "fly" this season.

Many growers using traps and lure lost more heavily than last year, but again many not using lure lost more heavily than last year. As already stated, however, throughout the district the large majority of orchardists this season enjoyed more freedom from "fly" than was the case last year.

In spite of the partial freedom from fly experienced this year by most growers, there were a few orchards in which the fly was fairly plentiful and active all the season through. In such orchards (generally in very sheltered situations), whether luring was carried out or not, the loss was fairly heavy.

Conclusion.

I consider it only logical to conclude from the foregoing facts that the comparative absence of fruit fly during the months of December, January, and February was in no way due to the use of traps baited with "Harvey's Lure." The same applies also to the use of repellents by some, and these I must consider—for the time being—are of little or no use.

It is, of course, possible that both "lures" and "repellents" may in future yet play an important part in fruit fly control, if it be found possible to make them efficient agencies.

The inefficiency of the "Harvey Lure" was very noticeable towards the end of the season, when, as above stated, what appeared as a wave, or army of flies appeared suddenly in almost all orchards at the same time, totally destroying late peaches, pears, and apples, irrespective of traps, lures, or repellents.

It is still my opinion, based on observations and experiments during the last three seasons, that "Harvey's Lure" *as it is at present constituted* is of very little value in controlling the fruit flies *C. tryoni* and *C. jarvisi.*

It must not be forgotten, however, that there are orchardists who, from their own point of view, consider "the lure" really efficient, and attribute their partial freedom from fruit fly this season to its use; nor must it be forgotten that it will undoubtedly catch what may be regarded as very large numbers of "flies," many thousand fruit flies having been caught by "lure" this season, one orchardist alone accounting for 2,000 fruit flies.* But the whole object of luring—*i.e.*, the prevention of the fruit fly ovipositing on the fruit is not generally accomplished when the "fly" is *present* in an orchard in any numbers, especially as was the case toward the end of this season; and such as has often been the case in previous years.

It is a curious fact that "Harvey's Lure" if placed outside an orchard in the bush timber, high up or low down, will catch exceedingly few if any fruit flies. This fact would seem to indicate that either fruit flies travel at a very high altitude, out of reach of the scent of the lure, or that "Harvey's Lure" has very little attraction under this circumstance for them. Possibly if a poisoned fly-food

* This number little exceeds what might have been reared from 200 maggot-infested fallen apples only, and accounted for by their earlier destruction.—H.T.

could be used in combination with an efficient lure as a spray, better results might be obtained.

Fruit flies have been caught in the Stanthorpe district this season with several different lures, in addition to "Harvey's Lure," with varying, but no special success.

Seasonal Origin of Fruit Fly: (A concluding note).—As I have before stated, I consider that the migration or immigration of the adult fruit fly from outside areas into the Stanthorpe district is the principal source from which our yearly infestation of fruit flies (*in greater or lesser numbers according to climatic or seasonal conditions*) is derived.

Fruit Flies and Native Fruits.

In the last of my periodical reports I stressed the danger of native fruits (*i.e.*, fruits of native plants) in contributing countless numbers of fruit-flies, *C. tryoni* and *C. jarvisi*, and I mentioned then—25th January, 1925—that certain fruit flies visiting this district had been bred and identified from their respective native host-fruits.

I have now to record this of three other species of fruit flies, two of them known to be injuriously related to cultivated plants, viz.—*Dacus cucurbitæ, Dacus cucumis*, and *Chætodacus latifasciatus*, Tryon and Jarvis Mss. These three fruit flies were, in March, bred by me from material supplied by Dr. T. Bancroft, of Eidsvold, Queensland, whose reputation as a scientist and as one of the foremost workers in fruit fly research is of fifty years' standing.

(*Note.*—I am very greatly indebted also to Dr. Bancroft for bringing to my notice many new host-fruits of *C. tryoni*, the "Queensland Fruit Fly," and also several new and interesting fruit fly parasites, and for very much valuable information on the biology of fruit flies in relation to Queensland.)

In April, 1924, I bred from infested pears and quinces a number of a light-coloured fruit fly that I had previously noted always made its appearance towards the end of each season and that I recognised as a species distinct from *C. tryoni*. Bred specimens of this fly were at this time forwarded to the Entomologist in Chief, who also concurred in regarding it as a distinct species, and he also named it after me.

On receiving some fruit fly specimens from Dr. Bancroft in January last, I was surprised to find a fly identical with this light-coloured fly—*C. jarvisi*. Dr. Bancroft had bred this fly from the fruit of the native Cockatoo Apple (*Careya australis*) in 1922, approximately two years before I had bred it from cultivated fruit.

Dr. Bancroft, at my request, kindly made arrangements that some of this native fruit should be sent to me, and in due course it arrived and was found by me to be very badly infested with fruit fly maggots. Specimens of these maggots were kept in fluid for reference, and eight fruits were put in a breeding jar in the Departmental Insectary. On 3rd March, 1925, the flies began to emerge, and after feeding them for a few days in order to let them attain their full colour and shape, they were carefully compared with our local species and proved identical with the species *C. jarvisi*, Tyron Mss.—The "Jarvis Fruit Fly" of orchardists.

A sample of the fruit was sent to the Government Botanist, Mr. C. T. White, for identification, and from him I learnt that the range of this fruit (*Careya australis*) was from Wide Bay to Rockhampton.

This fly is exceedingly plentiful in this native fruit, and I succeeded in breeding out 342 from nine fruits. The fruit is no bigger than a small-sized hen's egg.

As an experiment thirty of these fruit flies (equal sexes) were liberated on 14th March in one of the department's cages, over a fruiting Granny Smith apple-tree, in the orchard of Mr. Barlow, at Applethorpe. Some are alive and active to date—18th April, 1925—in spite of continued cold bleak weather. Several of the apples of this tree, moreover, have been recently stung and these are under observation in the Insectary. I consider that this very important finding is a strong link in the chain of facts supporting migration.

It is remarkable that only three parasites (*Opius tryoni, Silvestri*) were bred from the above material, and, in fact, parasites seem to play a very unimportant part in controlling the Queensland Fruit Fly so numerous in many of its native host-fruits, especially if they be of any size.

The following native host-fruits of the Queensland Fruit Fly have been made known to me by Dr. T. Bancroft—*Solanum aviculare, Murraya exotica, Carissa ovata* (*?Melothrix cunninghamii*), *Opuntia* (*Ficus indica*), and Wild Kumquat (*Atalantia*).

Specimens indeed of the fruit flies, bred from these fruits by Dr. Bancroft, have been received by me and the flies identified—with an exception—as *C. tryoni*. In many cases Dr. Bancroft was kind enough to supply me with the fruit, thus enabling me to secure both the maggot and the adult fly.

We cannot do otherwise than consider that native fruits play a very important part indeed in fruit fly propagation, breeding as they undoubtedly do incalculable numbers of fruit flies.

As early as 1864, as I learn, deciduous fruits grown in Brisbane were infested with fruit fly maggots, necessitating at that time their total destruction; as at this time there were very few deciduous fruits grown and certainly no large commercial orchards, and there is only one source then from which these infestations could have come—*i.e.*, native fruits.

Influence of Season (meteorological).—We must not overlook the fact that seasons, almost if not quite free from fruit fly infestation of the growing fruit crops, have been experienced in this district during the last twenty-five years.

Fruit flies, like all other insects, have their cycles marked by periods of increase and of decrease, as also their annual periods of principal oviposition—"stinging" certain fruits at certain times each season—and the greater or lesser degree of our yearly infestation of fruit flies in this district is very largely due to climatic and other conditions affecting biologically the increase or otherwise of fruit flies.—HUBERT JARVIS, 15th April, 1925.

CITRUS FRUIT IMPROVEMENT.

R. L. PREST, Instructor in Fruit Culture.

Citrus orchards in this State call for much improvement in fruits, standards, and variety of trees. The conservation, standardisation, and stabilisation of these varieties should receive most careful consideration by citrus propagators and growers.

The deterioration of these varieties through the unintentional propagation of undesirable strains is responsible for a large percentage of inferior fruits and low yields in many citrus orchards. The establishment of new varieties requires long periods of time to prove their value to the grower and to introduce them in the markets. In this State we have too many varieties in our orchards, many of them unsuited to the local conditions under which they are grown. This calls for much reconstruction in the orchards, by top-working inferior trees in established orchards with buds selected from productive trees of desirable strains on the basis of their records for a series of years.

The introduction of individual tree records will help the grower to determine the value of his trees, and point out the inferior ones to be top-worked with selected buds from the desirable and proven strains.

The importance of individual tree performance records as a basis for measuring the effects of cultural or other tree treatments, both in investigational and commercial work, has become so evident that such records are now regarded as of great value in all orchard work. When making changes in methods of tree culture, it is the way to determine the definite value of the new treatment.

Bud Variation.

Bud variation is of more or less frequent occurrence in trees of all varieties. It may show itself in the habit of growth of the trees, the size, form, texture, or colour of the foliage, or form, colour, texture, abundance, or scarcity of the fruit. Trees grown from a single bud will develop several distinct strains of fruit, frequently a single branch bearing fruits having different characteristics from the remainder of fruit borne by the tree. Thus it will be seen individual tree records show the extent trees differ from one another in regular bearing, and in quality and quantity of fruit produced, and enables citrus growers to have reliable information with regard to their orchards.

Citrus bud-wood should be cut only from the best trees, and should be selected on the basis of tree records from intimate knowledge of tree. Only fruit-bearing wood should be used for propagation. Bud-sticks should have one or more of the fruit attached when cut from parent tree. Such bud-wood will produce trees of satisfactory growth as well as regular yields of fruit.

Bud-sticks when cut should be heeled in in moist sand in a cool place. Under proper storage conditions it can be kept in good condition for several months.

Growers will readily recognise the importance and field for improvement if orchards are to be built up on a firm commercial basis.

BREEDING POULTRY.

By P. RUMBALL, Poultry Instructor.

In selecting a breeding pen several features have to be considered, but primary importance must be given to the results that are likely to be secured from the resulting progeny. To reproduce the species is not sufficient. Every effort must be made to increase their producing capacity. That it is possible to improve the egg yield of our fowls is being demonstrated by the increasing numbers of birds that score 300 eggs or more in our yearly egg-laying competitions, but there is still room for a general improvement in the general average production. If this is possible with breeders who may be classed as specialists in their line, how much more so is it with the stock that are kept on the average farm?

Mendelian students have demonstrated that the character for high egg production is hereditary and that, if your breeding stock do not carry the character, it is not possible to make any definite improvement. Australian breeders of poultry, by working on the lines of selection and breeding from only tested stock, have secured results that have made our strains of Black Orpingtons and White Leghorns world famed.

Inheritance of Egg Production.

Dr. Raymond Pearse, who did considerable work in this direction, states that the male bird dominates in the transmission of the character of high egg production in the pullet progeny, and that if a male bird bred from parents carrying this character is mated with poor laying hens, the pullets from the mating will be good layers, but that the sons will only sire indifferent or poor layers.

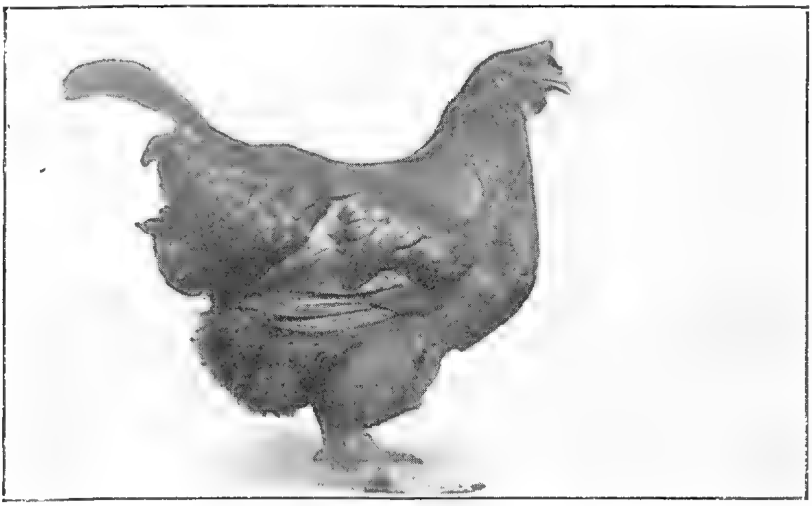


Plate 16.

This hen laid 287 eggs in the Mount Gravatt egg-laying test, 1924-25. The loose appearance of feathering is due to the fact of a moult.

Inheritance of Size of Egg.

This is a most important feature from a commercial point of view, and in an earlier issue of this Journal I illustrated that in the last egg-laying test held at Mount Gravatt £17 less revenue was received over a period of twelve months from 270 hens due to undersized or second-grade eggs, than would have been the case if all eggs were of a standard weight. Many breeders are content to only use for hatching purposes eggs of a standard weight, with the hope of keeping up the size of egg. This is perfectly correct as far as the cockerels are concerned, but it has been found in practice that the sire has to be the progeny of a hen that laid large eggs, owing to the fact that he transmits the quality of size of egg to his pullet progeny.

Inheritance of Size of Bird.

The lack of size in some of our laying breeds is becoming a serious defect. In many cases it is due to the unsatisfactory methods of feeding and rearing the young stock, but it is more commonly due to the undersized specimens of the breeding stock used. It is an old opinion among breeders that the female influences size. Mr. Laurie (South Australian Poultry Expert) found that large and small hens when mated with male birds which were as much alike as it is possible to get two birds, bred true to size.

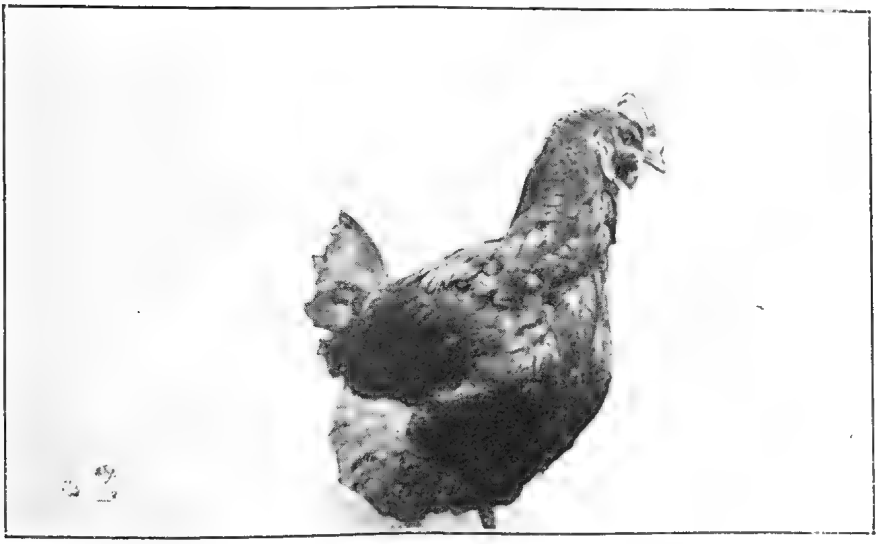


PLATE 17.

A Black Orpington which laid 113 eggs in the same test. Note the general coarseness of her head, sleepy appearance, and sunken eye.

Broodiness.

This is more common among the heavy varieties than our leghorns, although in some strains of the latter breed it is a serious defect. Among heavy breeds it causes untold work and serious losses in the egg yield. Various breeding experiments have been carried out with the idea of tracing the source of transmission, but the character of broodiness appears to be carried by both sexes, and the only way to eliminate the character from the flock is to breed from only non-broody hens and males the progeny of non-broody stock. The elimination of the character is difficult owing to the fact that a hen may not brood during her first or second year's laying season; she is used for a breeder and then causes trouble by brooding in her third season.

Age of Maturing.

It is frequently noticed that the age at which stock matures varies considerably even when reared and fed under the same conditions. The constitution of the parent stock no doubt plays an important part, but still some of it must be an hereditary feature, and from a commercial point of view, birds that take two or three weeks or even longer to mature than others are not the most desirable to use for the propagation of stock.

From the foregoing it will be seen that it is desirable to have some knowledge of the ancestry of the breeding stock, and more especially that of the male bird. It is impossible for every person to pay the necessary attention to the production of stud stock, and to them I recommend the purchase of suitable male birds every year or so, and their mating with the best females kept. As has already been pointed out the male bird plays a most important part both in the numbers and size of eggs.

The female mainly influences size and in most breeds type, and as already stated she transmits through her sons certain characters. Owing to the numbers of females needed for breeding purposes it is almost an impossibility to test all females, and resort has to be made to selection on the general appearances that have been noted in connection with high egg production.

It is better not to use a hen as a breeder until she has gone through her first laying season. During this period any bird that becomes sick, broody, or develops any other undesirable quality, or has any hereditary defects such as blindness, feathered leg or sprigged comb, should be marked and not used as a breeder. Do not wait until you are selecting your breeding stock to do this, for if you do some will slip by. From the eligible stock selection may then be made by working on the following points:—

Vigor and Constitution.—This is of primary importance and a somewhat difficult quality to guage. Viewed while yet on the ground she should be bright, active, healthy, of the type desired, and well developed.

Head.—Moderately long in light breeds, but not having a snaky appearance. In heavy breeds slightly shorter, but not coarse. Fineness in skull generally goes with a good layer.

Eyes.—Round and prominent. Colour, in Leghorns, rich orange red; Black Orpingtons, dark brown, so much so that they appear black. Round, prominent eyes generally indicate a layer and a bird with vitality. The eye should be set high and not too far back.

Face.—Clean, free from feathering or wrinkles. Experience has shown that the best layers are clean in face and the bright red faced bird is of good constitution and sound in health.

Comb and Wattles.—Thin and fine in texture. Excessive comb should be avoided. It is a drain on the system, and in the hens an impediment in feeding. In practice it is found advisable to remove excessive combs from the male birds, and it is as well to avoid breeding stock handicapped in this manner.

Neck.—Moderate in length. A long-necked bird is invariably weak, while an excessively short-necked bird is coarse. Egg production and coarseness do not go together.

Body.—Long, wide, and deep. The length as taken from the base of neck to tail, width as viewed across the shoulders and saddle, and distance apart of legs. Depth as viewed from the pelvic bones to end of keelbone and deep in chest.

Breastbone.—Straight and fairly long. With a short keel or breastbone the abdomen is liable to sag, and, consequently, the capacity for the digestive organs misguaged. Crooked breasts are liable to be due to perching, but it may be a constitutional weakness.

Pelvic Bones.—Little importance can be attached to pelvic measurement. The distance between the bones varies with laying, and some of the best laying hens that I have handled have had anything but long fine pelvic bones. The distance, however, between the bones and keel indicates capacity for the reproductive organs, although this measurement varies with the general condition of the bird.

Skin.—The texture of skin varies with laying, but it should always be thin and fine and velvety.

Legs.—Not too high, wide apart, good bone, with toes well spread. Long-legged birds generally lack constitution, and excessive leg has no relation to high egg production. In Leghorns and other yellow-legged varieties the colour fades with egg production, but returns during the moult. I would not, however, use an exceptionally white, shrunken-legged bird as a breeder.

Tail.—Not set too high. Tail carriage has no relation to egg production, but detracts from the general appearance.

Feather.—Depends upon the time of selection. The best of layers are generally well provided with feather which is close and flat on the bird. The close-feathered bird is warmer than the loose-feathered one, and consequently her digestive organs can turn more food into egg production.

General.—When you have satisfied yourself on the general type of the bird and catch her for examination, you may judge by the weight what her condition is. If she is either too light or too fat discard her, for neither condition is good for breeding purposes. Next examine her vent and feet. If her vent is at all fouled and offensive discard her. It may only be due to ovarian strain, but on the other hand it may be due to some bowel trouble. The feet should be examined for bumble foot or abcesses. I am confident that certain forms of bumble foot are hereditary.

A study of the accompanying plates should help in the general selection of a good laying bird.

Plate 18.

A White Leghorn which laid 276 eggs in twelve months. Note the bare head, closeness of feathers, and length of body.

ABSTRACTS AND REVIEWS.

All foreign agricultural intelligence in this section, unless otherwise stated, has been taken from "The International Review of the Science and Practice of Agriculture," published at Rome by the International Institute of Agriculture.

Potato Production under Irrigation.

RAMSAY, J. T. "The Journal of the Department of Agriculture," Victoria, Australia, Vol. XXII., Part 7, pp. 355-360, Fig. 4. Melbourne, 1924.

The peculiarities of soil environment and climatic conditions demand variation in methods of irrigation and cultivation. The author bases his statements on normal conditions and prevention of excessive moisture. In this case, irrigation one month from the date of planting has been found effective.

Instructions are given as to the advisable methods to follow prior to irrigation:—Date of planting; preparation of land for planting; manuring; cultivation. The weight of seed per acre recommended is from 12-16 cwt. preferably sprouted, and early varieties.

In practice, from 5-8 chains has been found the most satisfactory length for water to run, and on clay loams irrigation should be at a slower rate than on light soils.

The importance of cultivation after each irrigation is accentuated. The danger of excessive application of water is shown by the liability of low quality tubers to rot.

Size of Potato Sets: Comparisons of Whole and Cut Seed (1.)

STUART, W., LOMBARD, P. M., VOSBURY, M. C., CORDER, G., EDMUNDSON, W. C., CLARK, C. F., and DEWEY, G. W. (Office of Horticultural Investigations, Bureau of Plant Industry). United States Department of Agriculture, Bulletin No. 1248, pp. 1-43, figs. 12, tables 15, bibliography. Washington, D.C., 1924.

Although reports from various quarters are somewhat conflicting as regards the yield of potatoes from whole and cut tubers, the data obtainable as a result of experimentation in the States permit certain practical conclusions. Where there is a deficiency of moisture and plant food, medium-sized cut sets are advised, as the relative number of tubers produced will have a chance to reach a marketable size. A study of stem frequency correlation shows that, as the weight of the whole seed increases from 2-6 oz. the stem frequency varies from 3 to 7 stems respectively. Halved sets show a variation from 2 to 4 stems, and quartered sets from 3 to 6 oz. tubers average 2 stems.

The authors review the causes for disagreement as to the practicability of planting whole or cut sets and draws attention to the varying climatic and soil conditions, and more especially to the spacing of the sets to allow the maximum development. A comparison is made of the experiments carried out by numerous investigators and a detailed description is given of the tests made in recent years in the States.

Sex of Long-Carried Calves.

HOOPER, J. J. (Kentucky Experiment Station). "The Breeders' Gazette," Vol. LXXXVI., No. 13, p. 281. Chicago, Ill., 25th September, 1924.

It is a widespread belief among farmers that male sex is predominant among long-carried calves. In order to reach a definite opinion on this point the author has studied the records of the Kentucky Station herd with respect to about 500 pregnancy periods noted during the last thirty years; forty-four cases out of this number exceed the normal period of pregnancy (283 days), by 7 to 17 days, and of the forty-four long-carried calves born, twenty-five, *i.e.*, 59 per cent., were males, and nineteen, i.e., 41 per cent., females. This would, therefore, be a ratio of four females to six males.

Cross-Breedling of the First Generation in Poultry Rearing.

LEGENDRE, G. "La Revue de Zootechnie" (Stock Breeders' Review), Year 3, No. 8, pp. 144-148. Paris, 1924.

In poultry farming it is not the laying of eggs alone that provides profit. Numerous factors contribute to it, amongst which should be named, besides abundant egg-laying during the winter season, early development, sexual precocity, size of

eggs, vitality of embryos and young birds, adaptability to various external conditions, ability to obtain nourishment from the food supplied, &c.

Mixed breeds, therefore, undoubtedly possess valuable qualities, especially in regard to the last features.

In order to bring about an equal distribution of the qualities pertaining to pure and to mixed breeds, cross-breeding in the first generation has been resorted to, known as "industrial breeding."

In the case of poultry, the results shown by such first cross-breeding are as follows:—

Egg-laying:—

(1) The hybrids obtained by crossing two breeds often prove more prolific than their parents, an increase of ten eggs per head per year can be attained.

(2) Whatever may have been the vitality of the breeds crossed, the hybrids' eggs show better fertilisation and less waste. There is also a decrease in the death rate during rearing.

(3) Precocity is greater; young cocks reach market weight a week earlier than those of pure breeds, which results in greater economy of time, labour, and food.

(4) It is understood that owing to their greater vitality and greater fecundity, hybrid hens can be kept to advantage for longer periods; hence a further economy is effected as regards egg-laying and the care of birds reserved for reproductive purposes.

(5)—

	Cross-breeding of Pure breeds. Per cent.	Cross-breeding of First generation. Per cent.
Fertility of eggs	80-85 ..	85-90
Hatching as per fertile eggs	70-75 ..	75-85
Death rate during rearing, up to period of egg-laying in relation to birth rate ..	25-30 ..	15-20

(6) In some cases, in special crosses, it is possible to select, with a fair degree of accuracy, the male and female birds at the time of hatching. This allows of immediate treatment according to their different requirements, fattening for the market, or egg-production.

However, the crossing of breeds of the first generation also presents serious disadvantages; this has been proved in actual practice.

(1) The tendency of hens to sit is greatly increased. In order to obtain a regular output of eggs it is important to prevent them from sitting immediately the tendency is shown.

(2) It is necessary to keep two pure-bred pens, of which one should be larger than the other; the one for the cocks should be the smaller as very stringent selection cannot be so easily followed.

(3) The only remunerative sale is that of selected fowls or sittings of eggs from the two pens of pure-bred fowls.

In practice crossing can be effected by three different methods:

(*a*) *Cross-breeding of two light breeds*, producing hybrid hens of maximum sexual precocity, that may hatch late in the season, when egg-laying is abundant and temperature favourable to rearing. This method is best suited to specialised production of eggs.

(*b*) *Cross-breeding of a light breed with a heavy breed.*—In this case, the cock is taken from the light breed, so that the hens are not injured. A special feature of this form of breeding is the particularly rapid development of the young cocks, which inherit the mother's strength; the young hens will on the contrary, inherit from the cock's side. The young birds in this case will be heavier, and will require more feeding than in the first instance, but will possess the maximum of qualities sought for in poultry farming.

(*c*) *Cross-breeding two heavy breeds.*—Minimum advantages to be obtained.

After study of the practical effects of the second method of crossing, the author is of opinion that it is too complicated, entailing considerable expenditure for installation, labour, &c.

In short, in spite of the real advantages to be derived from the crossing of the first generation, it would seem that the actual money return is higher from well-tended pure breeds.

Pig Feeding Experiments Involving the Use of Self-Feeders.

LAGO, F. P. (Department of Animal Husbandry). "The Philippine Agriculturist," Vol. XIII., No. 1, pp. 29-44, 5 Fig., bibliography. Los Baños, Laguna, 1924.

The author refers to former experiments that have proved the economic value of self-feeders in pig feeding.

Details are then given regarding experiments carried out with the following aims in view:—

(1) To determine the relative values of sweet potatoes, cowpeas and mangoes, together with concentrated food such as maize, rice-bran, and cocoanut-cake, placed in a self-feeder and at the disposal of the animal;

(2) The relative value of maize, cocoanut-cake and rice-bran placed in the self-feeder at the disposal of the animal, with roots in both cases;

(3) The relative advantage of self-feeders and hand feeding, using maize, rice-bran, and cocoanut-cake in the self-feeder, at the disposal of the animals, and that of the same concentrated foods fed by hand according to the modified Wollf-Lehmann standard;

(4) To ascertain if the addition of dried shrimps, as animal protein in the rations, is advantageous in fattening pigs, with sweet potatoes as vegetable feed.

In order to carry out these experiments the author used Berkshire-Jalajala cross-breeds and three Berkshire-cross pigs. In forming the groups for experiments, the greatest possible uniformity was obtained with respect to age, weight, sex, breed, development, &c.

The animals were weighed separately for three consecutive days at the start and at the end of the experiment, as well as every ten days during its course, between the hours of seven and ten. The animals were constantly and amply provided with water.

The author gives details of the experiment grouped in five tables, from which the following conclusions are drawn:—

(1) Under the conditions of the test, for fattening pigs for the market, which received by means of self-feeders a ration of maize, rice-bran, &c., cocoanut-cake, potatoes and cowpeas proved to be of about the same value.

(2) As basic foods for fattening pigs for market, maize proved of greater advantage than rice-bran. In both cases the feed was supplemented by cocoanut-cake and sweet potatoes.

(3) The results obtained favour the use of self-feeders in place of hand-fed rations based on the modified Wollf-Lehmann standard.

(4) The addition of shrimps to rations, in order to provide animal protein has not proved advantageous for fattening of pigs for market.

DOES FALLOWING PAY.

E. A. SOUTHEE, Principal, Hawkesbury Agricultural College.*

If there still be any farmers who are disposed to ask whether fallowing pays, they have the answer in the testimony of scores of successful men in all parts of New South Wales. Positive evidence is welcome, however, and we have it in figures kept since 1903 by Mr. W. W. Watson, of Tichborne, near Parkes. During almost the whole of that time Mr. Watson has consistently adopted fallowing as a cultural method, omitting to do so only for a couple of years early in his farming career, and he has separately recorded each year the yields from fallowed and non-fallowed land on his farm.

* In the "Agricultural Gazette" of New South Wales.

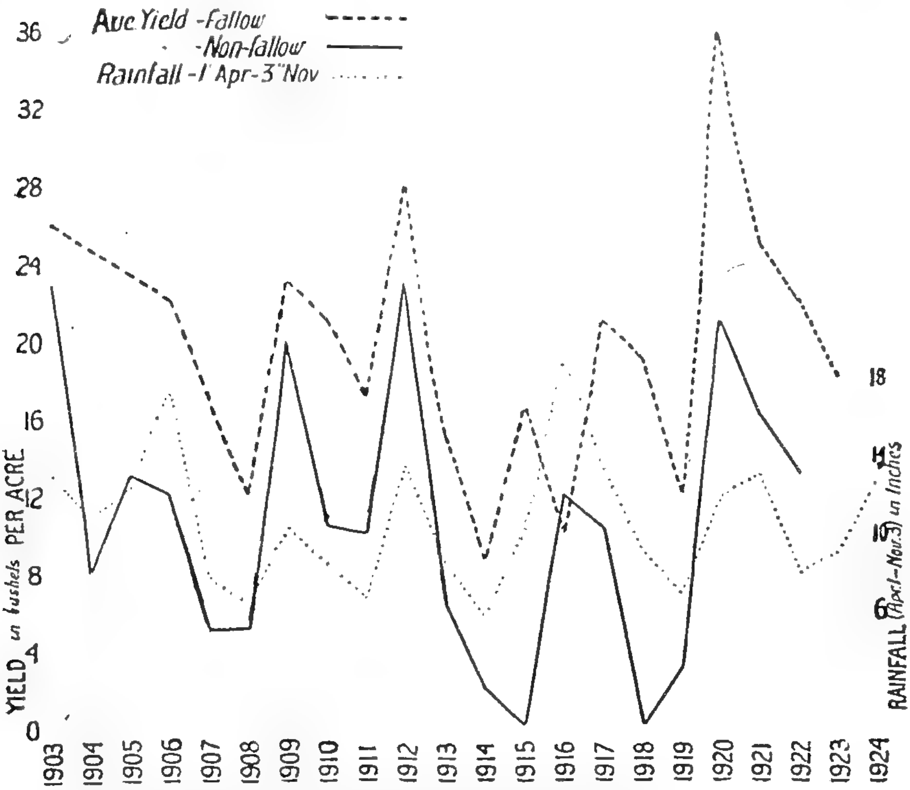


Chart No. 1.—Comparing yearly productions per acre from fallowed and non-fallowed land, and showing the total rainfall for the period 1st April to 3rd November in each year.

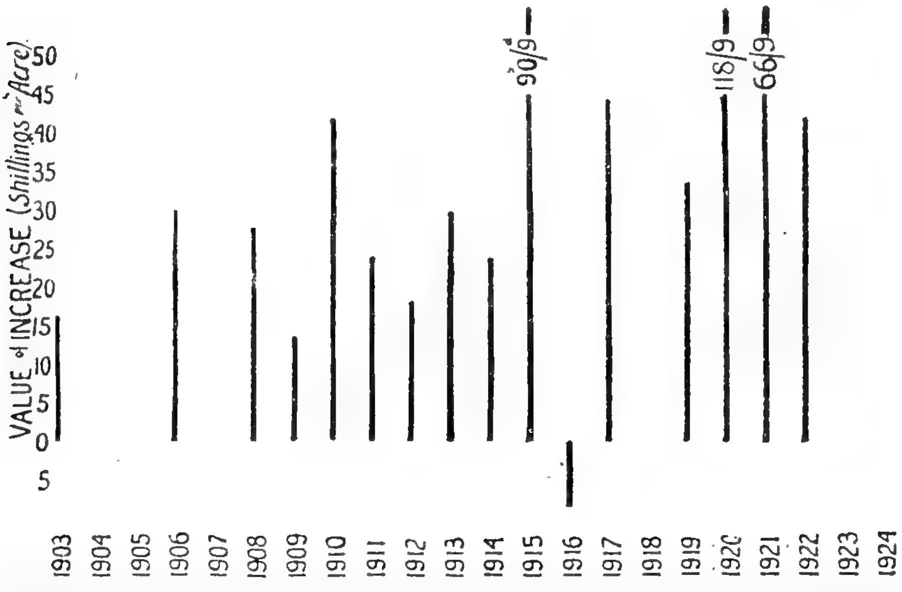


Chart No. 2.—Showing the value of the increased yield each year resulting from the practice of fallowing. In one year the return from the fallowed land was a little less per acre than that from the non-fallowed.

The figures were given a few years ago in the "Agricultural Gazette" by Mr. H. Bartlett, Senior Agricultural Instructor, but just lately Mr. Watson was good enough to supply the records of his operations for the seasons 1921 to 1923, and charts have been prepared for use at the College expressing the results in such an effective form that it was thought they would also interest readers of the "Gazette."

For the harvest just completed the average yield on the farm was 30 bushels per acre—all being on fallow, so that had the line that indicates the yield from fallowed land been extended to represent 1924 it would have terminated in a sharp rise. The rainfall for 1924 was 25.77 inches, of which 8 inches fell within four weeks of the first week in November.

It will be observed that the chart shows no return from stubble land for the past two years. This, says Mr. Watson, is intentional, as he does not consider it pays to grow wheat on stubble land in districts like Parkes.

It will also be observed that the average yields for the past four years have been far above any other period. This Mr. Watson attributes in the first place to the adoption of improved cultural methods, and in the second place to the use of superphosphate.

Chart No. 1 shows the average yield in each year from the fallowed land on the farm, the average yield from the non-fallowed land, and the rainfall for the period 1st April to 3rd November in each year.

Chart No. 2 expresses the difference between the value of the yields from non-fallowed and fallowed land. To arrive at this comparison the price per bushed quoted in the Official Year Book for each year has been taken. It will be seen that in some years the difference was very substantial, reaching 118s. 9d. per acre. Only in one season (1916) was the difference between the two methods of cultivation in favour of non-fallow, and that was due to excessive rain (13 inches between September and December) causing the very heavy crops on fallow land to lodge. It is estimated that, including interest on the land for the whole period, a fallowed crop costs about 6s. 3d. per acre* more than a non-fallowed crop, so that (apart from other respects in which fallowing is undoubtedly the best method) fallowing has paid Mr. Watson very handsomely in the twenty-two years.

* These costs, of course, refer to only classes of soil met with in the wheat areas of New South Wales, and can only be an approximate guide for the information of Queensland wheatgrowers.—Ed.

FRUIT FLY INVESTIGATION.

ENTOMOLOGIST'S REPORT.

Report of the Entomologist, Stanthorpe District, Mr. H. Jarvis, April-May, 1925.

Fruit Fly Emergence under Laboratory Conditions.

Throughout the months of April and May fruit flies (*C. tryoni*) have been emerging in the Insectary from maggots infesting late pears and quinces. The following is a record of hatchings for these months from both cultivated and wild fruits:—

Date.	Species of Fly.	Number Hatched.	Fruit.
7 April	*Chætodacus tryoni* ..	10	Pear
9 ,, ...	,, ,,	5	,,
16 ,, ...	,, ,,	20	Pear and quince
23 ,, ...	,, ,,	2	Pear
27 ,, ...	,, ,,	5	,,
28 ,, ...	,, ,,	6	Pear and quince
28 ,, ...	,, ,,	2	Quince
5 May	,, ,,	20	Pear and quince
6 ,, ...	,, ,,	20	,, ,,
13 ,, ...	,, ,,	6	Pear
14 ,, ...	,, ,,	3	,,
20 ,, ...	,, ,,	14	,,
28 ,, ...	,, ,,	4	Pear and quince

* On 15th April Mr. H. Jarvis, in compliance with specific instructions, submitted a report "On the results of departmental measures in controlling the fruit fly in the Granite Belt area during the season," a document that includes valuable data of public interest. *Vide* Report poster, pp. 48-52.—H.T.

Fruit Flies Bred from Native Fruits.

Date.	Species of Fly.	Number Hatched.	Fruit.
17 April	*C. tryoni*	2	*Opuntia* (*Ficus indica*)
16 ,, ...	*Dacus cucumis* ..	2	*Bryonia* sp.
16 ,, ...	*Dacus cucurbitæ* ..	1	,,
16 ,, ...	*Chætodacus* sp. ..	4	,,
28 ,, ...	*C. tryoni*	6	*Carissa ovata*
6 May	,, ...	20	,,
14 ,, ...	,, ...	10	,,
16 ,, ...	,, ...	5	,,

On the 23rd, 24th, and 25th of April severe frosts were experienced, with ground temperatures registering 12 deg. F., 10 deg. F., and 16 deg. F. respectively.

Field Experiments.

On 18th March, 1925, thirty specimens of *Chætodacus jarvisi* were liberated in one of the departmental cages at Applethorpe. This cage enclosed a Granny Smith apple-tree carrying fruit. This experiment was kept under observation at intervals of every few days, until 20th April, on which date, apparently, only one fly (a female) remained. No examples of this fruit fly were seen in this cage after this date. These flies had lived just one month, and during the whole of that time cold and inclement weather was experienced. This experiment will probably have to be repeated earlier next season.

On 16th April twenty-four newly emerged fruit flies (*C. tryoni*) were liberated in cage No. 2, enclosing a quince tree, carrying fruit; much of this fruit was, unfortunately, at this time attacked by *Monila fructigena* (Brown Rot). On 5th May twenty additional specimens of *C. tryoni* were liberated in this cage. These fruit flies have been kept under observation to date (2nd June) but have failed to oviposit.

A large quantity of maggot-infested fruit has been placed in each of these experimental cages, in order to finally test the possibility of the fruit fly over-wintering as a pupa in the Granite Belt.

Local Native Fruit as Fruit Fly Host.

On 27th April a visit was made to the *Notoelæa longifolia* trees growing on the property of Mr. W. Townsend (Severnlea). In the fruit of these trees last season fruit fly maggots were discovered, and numerous fruit fly puparia secured in the soil underneath the trees. A careful search this season, however, failed to bring to light any fruit on these trees or on the ground underneath them.

Fruit Fly Parasites.

Five interesting and apparently new fruit fly parasites have been secured from materials sent from Eidsvold by Dr. T. Bancroft, viz., two Ichneumons, one Braconid, and two Chalcids.

Throughout the months of April and May much valuable material also has been received from the same source, and so we have been able to breed the fruit fly *C. tryoni* from several native fruits—notably, from that of *Carissa ovata*—from the berries of which forty-eight specimens of *C. tryoni* were reared by Mr. S. M. Watson (assistant).

We are also fortunate in possessing (through the courtesy again of Dr. Bancroft) the maggots and puparia of most of the fruit flies associated with native fruits in his district.

Visit of New South Wales Inspector.

On 14th May, Mr. E. J. Lindsay, Fruit Inspector, New South Wales, called at this office, and a visit was made in his company to the departmental cages at Applethorpe. Mr. Lindsay was much interested in the over-wintering experiment, and concurred in considering this test would prove a fairly conclusive one; and also, insisted on the value these cages should prove in securing future data on important biological points relating to fruit flies. A search was made under the infested fruit in them for fruit fly puparia, and many were found in a few minutes. It is, of course, possible that many of them at present in the soil in these cages will hatch before mid-winter.

Useful Insects.

During the months of April and May the cold and inclement weather throughout these months proved a check to the activities of the introduced Woolly Aphis parasite *Aphelinus mali.* There is, however, every likelihood of the parasite over-wintering in every orchard where it has become established.

A large stock of parasitised aphids have been secured and placed in the Insectary, and an abundant supply should be available for distribution about September next.

Woolly Aphis Control by "Carbolacene."

A very interesting experiment was carried out by Mr. G. Ross, of the Summit, with "Carbolacene" as a possible control for woolly aphis. Mr. Ross's method of using this chemical substance is as follows:—A hole ⅜ of an inch in diameter and about 2 inches in depth was bored downwards, at an angle of about 60 deg. into the trunk of the tree; this hole was then filled with "Carbolacene," and a little added each day for a week to replace amount absorbed; the hole was then plugged up. Mr. Ross is hopeful of good results and intends persevering with this experiment next season, when a test-tree or trees can be arranged for, and some definite information on his assumed effective method of control obtained.

Official Staff.

For some time past the need for additional assistance has been felt, the care of the Insectary, field cages, and the distribution of the Woolly Aphis parasite all requiring more time than could be conveniently devoted to them.

On 1st April this need was well met, Mr. S. M. Watson being seconded to this office as Assistant.

Mr. Watson has proved himself both painstaking and industrious, possessing, too, an aptitude for the technique of entomology and the arrangement of insects.

Field Day.

After conference with the Chief Inspector, Mr. T. W. Lowry, it was decided, during the winter months, to institute an occasional field day in order to enable the members of the inspectorial staff to become familiar with some of the economic insects likely to be met with in the course of their official duties.

The first of these days was held on 15th May, and was found to be of mutual benefit to those concerned.

Fungus Diseases, &c.

Several valuable reports have been recently received from the Government Entomologist and Pathologist, Mr. H. Tryon, on specimens submitted.

All such reports of the Pathologist are now filed, under there respective headings, and are accessible to every member of the official staff. (H. Jarvis, 6th June, 1925.)

NOTES ON THE OVIPOSITION OF THE BEAN FLY

(*AGROMYZA PHASEOLI* Coquillet).*

By F. G. HOLDAWAY, B.Sc., Entomological Assistant.

This insect commonly causes considerable damage to beans of several varieties, including French, Lima, and Madagascar, particularly during the late summer months.

The adult is a tiny metallic black fly, 1½-1¾ mm. in length, with maroon coloured eyes.

Records of its distribution include localities ranging from Gosford in New South Wales to Cairns in North Queensland. (It has recently been recorded attacking French and Canadian Wonder beans in the new Callide Valley settlement.)

The symptoms of attack are fairly well known. The stems of the badly affected plants become flabby and brown just above the surface of the soil, and eventually the plants wither and fall over. This final stage of the damage seems to have been responsible for the opinion held by many people that the female Bean Fly deposits its eggs in the main stem close to the surface of the soil.

* *Vide* Jarvis, E., "Notes on the Bean Fly," "Queensland Agricultural Journal," xxx., pp. 124-125 and 192-195, Pls. 30 and 31. These notes are a restatement of the facts recorded in 1913 (without reference to those since elsewhere published), rendered necessary by the erroneous account given by Froggatt ("Agricultural Gazette," N.S.W., xxxiii. (1922), p. 552).

The following observations were made at Brisbane on 17th February, 1924:—

As far as could be seen the eggs were only laid in the leaf tissue, oviposition taking place on the upper leaf surface in direct sunlight and during the warm parts of the day.

The female fly walks about on the upper surface of the leaf, occasionally stopping and apparently searching for a suitable place in which to lay. This act takes place by the female inserting her ovipositor vertically into the leaf and then working it round through an angle under the epidermis posterior to the point of insertion. By this movement the mesophyl tissue is broken down and a cavity, roughly elyptical in outline, is made under the epidermis, with the hole through which the ovipositor is withdrawn situated excentrically. After its withdrawal the fly walks backwards and appears to suck up any sap which may have exuded as a result of damage to the leaf.

The whole process from start of insertion to withdrawal of the ovipositor takes from four to ten seconds. Eggs are not laid every time the leaf is punctured. In one young leaf 111 punctures were counted and a large percentage did not contain eggs.

PLATE 19.—EGG IN SITU. COVER OF CELL REMOVED.

(*Agromyza phaseoli*).

Eggs deposited in the cavities are invisible until brought to view by removal of the upper epidermis. The epidermis covering the cavities eventually turns yellow, so that a leaf which has been attacked shows numerous yellowish-green patches marking the position of the punctures.

The egg is elongate, being .3 mm. long and .14 mm. in diameter. The ends are rounded and there is a short projection on one end. In colour the egg is white and its surface is smooth and opalescent.

On hatching from the egg the tiny larva mines in the leaf and eventually finds its way to a vein and thence downwards in the stems. Pupation usually takes place in the main stem on a level with and just above the surface of the soil, but sometimes in the lateral stems.

These observations confirm those made by Mr. E. Jarvis some years ago, and that were interesting in view of the fact that had been stated that the Bean Fly laid its eggs in the main stem.

The full realisation of the manner and place of oviposition suggests many lines of investigation which may lead to the control of this serious bean pest.

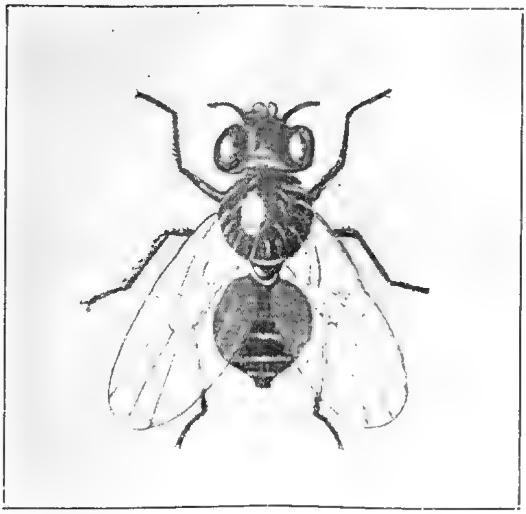


Photo.: Department Agriculture and Stock.]

PLATE 20.—BEAN FLY x 15.

From drawing by E. Jarvis, "Queensland Agricultural Journal," xxx., Plate 31.

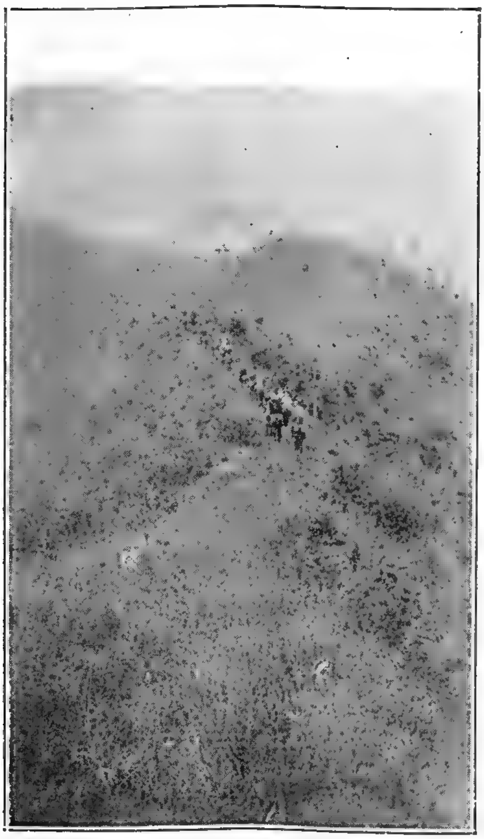


Photo.: C. R. Harrison.]

PLATE 21.—"A LONG, LONG TRAIL A-WINDING."

Running one of the spurs of the Macpherson Range.

FLOWER GARDENING FOR AMATEURS.

By MAJOR A. J. BOYD, F.R.G.S.

In our sunny Queensland, where all the flowers of tropical, sub-tropical, and temperate climates can be grown out of doors, few people realise to what perfection the extensive cultivation of flowers has been brought in some countries which would scorn to be debarred by their climate from such an enjoyment. No doubt, in years to come, when civilisation is more advanced, and there will be more leisure than is usually available to the pioneer in a new land, an ennobling taste for flowers will also develop in our midst, and, in addition to the simple delight of beautifying the home, a lucrative trade in cut flowers and pot plants will arise. Meanwhile, let everyone blessed with the possession of a home make it homely and attractive by surrounding it with a few of the less exacting flowers. Our opportunities in that direction are, perhaps, unique in the world. Then let us rise up and be equal to them. A few small beds of flowers around the family home are a constant source of pleasure, enjoyment, instruction, recreation, and in years to come, when we are wandering through the world, of the most pleasant recollections connected with our childhood.

When we look round the suburbs of Brisbane and compare the tasteful adornment of some of the residences of city workers with others adjoining them, where no attempt has been made to beautify even the piece of land in front of the house, we cannot fail to be surprised at the neglect of so charming a relaxation after a day's work in the hot city offices and shops as gardening affords.

Horticulture is a most delightful hobby, and may, by its absorbing interest, become something more than a pastime. He who would lay out for himself a rural paradise here below, cannot do so more successfully than by planting trees and flowers. But how do many people set about this work?

Some plant trees merely to shut out their neighbours. There is another class who set apart a small plot of ground near the dwelling, and lay it out with a dash of so-called architectural skill, mostly of a varied and severe type, the beds diversified in form and size like a collection of animals in a zoo. Into these beds are jammed as many plants as the superficial area will accommodate, no allowance being made for future development. Could anything be more out of tune with Nature?

But even this is better than the condition of many of the back yards, where the picture usually presented to one's view is:—A washing boiler standing sad and lonely on three bricks, half buried in a healthy patch of *Sida retusa*. A few kerosene tins in various stages of decay; numerous variegated jam tins, intermixed with unchoppable blocks of wood from the wood heap. A few tired-looking clothes props; a consumptive-looking peach-tree that does duty as a hen roost or supports a clothes line; and a rickety tumble-down fowlhouse.

How to alter the picture is the next question. The first thing asked by those who have determined to make a garden is: "What will it cost?" That is a very natural and important question. To make a garden properly, you must take an active hand in the work yourself, remembering always that with ordinary commonsense any kind of soil can be converted into a garden for the production of flowers and vegetables.

The great secret in successful horticulture is a perfect knowledge of the seasons, so as to adapt each variety of cultivated flowers to the needful temperature and rainfall. Seasonable sowing, transplanting, and pruning, and seasonable working are the elements of success.

Laying Out the Garden.

There are two ways of laying out a flower garden, the "formal" and the so-called "landscape" or "natural" style. I will at once discard the formal garden as being quite unsuited to horticulturists, whether amateur or professional. In a garden, which is man's work, man's hand should be visible, showing some object in view. The garden should be designed with some apparent relation to the external shape of the house, and the beds so arranged that only portions of the garden can be seen at once from different points.

If the grounds available for the formation of a garden will lend themselves to the creation of a grass lawn in front of the house, so much the better, for nothing sets off a garden so well as a well-kept lawn, laid down with couch grass. If space will permit, the lawn should be circular, with a gravel path running round it, but, if not, the gravel path should lead from the front gate to the house. A flower border right round the house, or at least in front, should never be omitted. After the lawn has been marked out, flower beds corresponding to its shape may be cut out. But, before anything is done in this way, the soil must be thoroughly broken up, trenched, drained, manured, and levelled. It will then be ready to be laid out in beds.

The laying-out of the beds is a matter depending on the good taste and very often on the eccentricity of the gardener. Some prefer a rigidly geometrical appearance, like the formal Dutch garden. Others delight in irregular, scattered beds, traversed by winding grass or gravel paths, bounded by privet or Duranta hedges, with here and there light bamboo trellises and pergolas supporting flowering climbing plants. With the addition of a few shade trees, such as jacarandas, poincianas, albizzias, magnolias, and other flowering trees, such a garden, well cared for, is a never-ending source of pleasure and provides enjoyable employment for the owner. Wherever a plentiful supply of water is available, a small pond and one or two fountains will lend additional beauty to the natural garden. There are many beautiful aquatic plants which will thrive in the pond, and others which can be grown to best advantage around its edge in the soil. In this climate, a bush-house is almost indispensible for shade-loving plants, such as orchids, many varieties of ferns, caladiums, primulas, gloxinias, calceolarias, cinerarias, and others. Rockeries, again, afford ample scope for further beautifying the garden.

Hedges.

A well-trimmed hedge round a garden is always more pleasing to the eye than a paling or wire fence, and, with ordinary care and forethought, there is no difficulty in quickly producing a handsome and, at the same time, an impervious hedge. In ordinary good garden soil, it will suffice to dig a trench about 2 feet wide and from 12 to 15 inches deep along the fence, breaking up the soil well before returning it to the trench. Of the several kinds of plants suitable for hedges, the two best for the climate of Queensland are the privet and the *Duranta plumieri*, both blue and white. The latter makes the most rapid growth. It strikes freely from cuttings, is seldom touched by wandering stock, and forms a dense growth. In less than three years after rooted plants are put in, it will make a good hedge 4 to 5 feet high. If rooted plants are used, plant them about 15 inches apart, and cut down to about 6 inches. Cuttings should be placed at about half the distance apart (6 to 8 inches). These latter should be 12 inches long, and only two buds should be above the ground. See that the soil is pressed close to the base of the cutting. The operation should be performed in damp weather. Failing this, attention must be paid to watering until they have taken hold of the ground.

Evergreen hedges, such as the above, should be regularly pruned, preferably in the spring, and kept at a breadth of about 18 inches.

Lawns.

The land having been prepared as directed, the next thing to do will be to form the lawn. The ground must be well ploughed or dug during the summer, if possible, and allowed to lie for a short time exposed to the action of the sun, wind, and rain, before being harrowed down. The more the soil is worked, whether ploughed or dug, harrowed or raked, the better it will be for the future grass, since the more plant food is thus rendered available. All the grass, weeds, and other rubbish gathered by the harrow or rake may be burned either on the ground or close to it, and the ashes scattered over the surface of the worked ground. The latter has to be reduced to as fine a tilth as possible to enable it to slightly cover such small seeds as grass seeds. In order to give body to the soil for the establishment and maintenance of the grass, bonedust should be applied to the soil at the rate of about 5 lb. per square perch before the seed is sown. When sowing grass seed, it is well to mix it with fine ashes, by which means the small seed is more evenly distributed than if it were sown alone. To make a good lawn, thick sowing is imperative—1 lb. per square perch is quite little enough to produce a close, springy turf. As soon as the seed is sown, harrow in with a light brush harrow, which is preferable to using the rake. Then roll the ground with a heavy roller, to give firmness to the soil, and to prevent evaporation in dry weather and the scorching up of the young plants before they have become firmly rooted. During such weather, water frequently, both before and after the plants are up.

As soon as the grass is high enough to catch the scythe it must be closely mown, then rolled, and the process continued every week, because it ensures a close bottom being obtained.

Top-Dressing.

Whether the soil be rich or poor, the lawn will always benefit by an occasional top-dressing with bonedust, wood ashes, or other fertilisers. A good liquid top-dressing consists of fine mould, mixed with 1 oz. of nitrate of soda and 1 oz. of potash sulphate, dissolved in 4 gallons of water. Give a good watering with this solution immediately after top-dressing with solid fertilisers. Never use any chemical to destroy weeds on the lawn. They should be taken out by the roots by hand.

A Cheap and Effective Roller.

As already stated, a lawn requires a good deal of rolling, and a roller is a rather expensive garden appliance.

To those who do not wish to invest in the expensive article, the following description of one made by the writer may be useful. It has long been in use, and has worked admirably. Get a galvanised-iron cylinder made by your plumber out of not less than 22-gauge iron, about 24 inches long and 15 inches in diameter, with the seam of same made on the inside; into each end fit two wooden circles out of 1-inch thick timber, exactly the same diameter—viz., 15 inches. Perhaps a shade more would be better, so as to make them fit tighter. In the centre of each of these wooden ends bore a ⅞-inch hole, to take an iron bar (round), to act as the axle of the roller. Then get half a barrow load of fine screenings, the same quantity of clean sand, and about 2 buckets of cement, the proportions used to make a good solid binder being 1 part of cement to 2 parts of sand and screenings mixed. Of course, charges can be made stronger as desired. It might be as well to get a bricklayer's advice as to the proportions in making the cement. To fill your cylinder, insert one of the wooden ends into same, allowing it to stand flush with the outside edge; then stand on its end, inserting the bar of round iron (axle) in the hole already bored, allowing it to project about 2 inches through, to allow for a handle to be fastened on. Then get ready the cement, turning the mixture over well, and using it fairly wet, so as to fill up all crevices; fill up cylinder as quickly as possible, ramming the mixture well down. See that you have sufficient to fill the cylinder at one charge. Fill up to within an inch of the top; then put on the other wooden end, and allow the roller to stand until the cement is thoroughly set. For the handle, the same shape as that of an ordinary lawn mower, on a large scale, acts very well. Fit same on, and the roller is ready for use.

Laying Out the Beds.

Whatever may be the style of the beds, they should be symmetrical; they should not be too large, and sufficient space, whether of turf or gravel, should be left between them. The figures should be simple and without acute angles; complex figures are especially to be avoided, as they are difficult to plant effectively, difficult to keep neat and clean, and hence cause an increase of labour, with corresponding extra expense. The best way to lay out the beds is to first make a plan on paper, and then transfer the design to the ground, the paper plan having been drawn to scale.

Having this plan to go by, the gardener will have no difficulty in laying out the beds symmetrically, as the garden line will enable him to strike circles on the ground as correctly as the compasses will on the paper.

Before a figure is begun, the ground must be trenched, levelled, raked, and rolled hard and smooth; a pointed stick will then make all the mark that is required, and a number of pegs to place in the portion of the figure that is to be preserved will suffice for the rest.

The walks should be laid out and formed with a rise of 2 inches at the centre, to prevent the lodgment of water. The surface gravel need not be deeper than 3 inches, as it may be practicable to add a little annually, so as to maintain a fresh appearance. Walks seldom require a foundation of metal, unless the soil be soft or moist.

Arrangement of Plants.

Plants may be arranged in either of two different modes—one in which each plant stands singly; the other in which a number of plants of the same species are arranged in a group. The adoption of either of these styles depends upon the size of the garden. Where the area of land is small, the single-plant or "dot" system must be chosen, otherwise there might not be room for the number of sorts it is desired to plant. But where the area of ground is larger, then the grouping system should be followed, in order that the same species or variety may not have to be duplicated.

The grouping style consists in planting a given number of plants of each species in a mass, of a size proportionate to the extent of ground, allowing each plant just as much space as, when grown up, will cause the group to appear as a whole, without being overcrowded. The strict rule of having only one group of each kind may, in certain cases, be departed from, as when it is desired to brighten parts of the plot by lilies or other gay flowering plants. The plants should be arranged according to height and colour, the dwarfest in the front and the tallest at the back, for, though a slope perfectly level on the surface is not desirable, plants vary in height and bulk from one year to another to such an extent that there is little danger of perfect uniformity being produced. Of course, the groups should be irregular in

form and size. The arrangement of colour is, however, of extreme importance, for, unless it is carried out in a scientific manner, the collection will fail in attractiveness. There should be no violent or jarring contrasts, and the season of flowering of each kind must be taken into account, so that there may be an equal proportion of flowers throughout the plot at all seasons.

Watering Plants.

Of all the processes in gardening, watering is the one that is most frequently ill-performed. It is customary with amateur gardeners to wash the dust off garden plants by watering overhead. The idea is to clean the leaves, open the pores, and so give the poor plants a new lease of life. But this overhead watering is a great mistake. A too-common method is to water little and often, by which the soil is hardened and the roots brought so near the surface that, in the event of the soil becoming dry, they are likely to perish. Many do not commence to water sufficiently early in the season until the plants show that they are suffering from the want of it, whereas watering should be commenced as soon as the soil begins to change from wet to dry, so as to keep up a full supply of moisture and enable the plants to take advantage of the high temperature, which they cannot do unless fully supplied with liquid food. When the flowers are out, care should be taken that too much water does not get on them, or they will be bleached by the sun, especially if watering is done in the morning. At any time water on the flowers is not good. The best time to water is in the evening. Give the plants water at the roots—as much as they will take up—and the tops will look after themselves. In order that the water may pass freely downwards, the soil should be loosened with a fork to as great a depth as can be done without coming in contact with the roots. The more water you give plants, the more they require. This is especially the case with the annuals. Take two of the same kind, stand one in water and just keep the soil of the other moist; the one in the water will flag more in the sun than the other.

Mulching.

Watering should be followed or preceded by mulching, which has a most beneficial effect in retaining moisture in the soil. Mulching checks the fierceness of the sun's rays during the hot months, thereby keeping the surface cool, retarding the evaporation of moisture, and protecting the surface roots. The operation of mulching consists in spreading on the surface of the soil around plants, shrubs, or trees (so as to entirely cover the roots) any light material that will sufficiently shade the ground without preventing the passage of rain into the soil. Various materials may be used as a mulch, such as rotting straw, decayed leaves and weeds, leaf mould, fine top soil, spent tan, and well-decayed manure. As neatness is requisite in a flower garden, the four latter materials will be found the best to use.

FORTHCOMING SHOWS.

July 1–2 —Gatton.
2–3 —Biggenden.
2–3 —Kilcoy.
3–4 —Proserpine.
3–4 —Sandgate.
7–9 —Townsville.
7–11—Gayndah.
8–9 —Laidley.
9–10—Woodford.
11—Wellington Point.
15–16—Charters Towers.
16–17—Caboolture.
22–23—Ingham.
24–25—Rosewood.
24–25—Ayr.
24–25—Ithaca.
28–29—Barcaldine.
29–30—Bowen.
29–30—Nambour
31 }
Aug. 1 } Pine Rivers.
1 —Mount Gravatt.

Aug. 5–6 —Redcliffe.
10–15—Royal National.
22—Belmont.
26–27—Crow's Nest.
29—Coorparoo.
Sept. 2–3 —Esk Bushmen's Carnival.
4–5 —Wynnum.
12—Zillmere
16–17—Imbil.
19—Stephens.
23–24—Gympie.
24–25—Beenleigh.
26—Maroochydore.
26—Rocklea
Oct. 1 —Kenilworth.
2–3 —Toombul.
9 —Southport.
10—Enoggera.
16—Nerang.
17—Balmoral.
Nov. 25–26—Pomona.

Photo.: C. R. Harrison.]

PLATE 22.

RUNNING CREEK FALLS, MOUNT GIBSON, MACPHERSON RANGE.

Photo.: C. R. Harrison.]

PLATE 23.

A FAVOURITE CAMPING GROUND ON RUNNING CREEK, MOUNT GIBSON, MACPHERSON RANGE, NEAR THE NEW SOUTH WALES BORDER.

A party of Campers from around Beaudesert.

PLATE 24.—TYPICAL DURANGO COTTON PLANT, CHARTERS TOWERS.
Note the size of the bolls and the way in which they are opening.

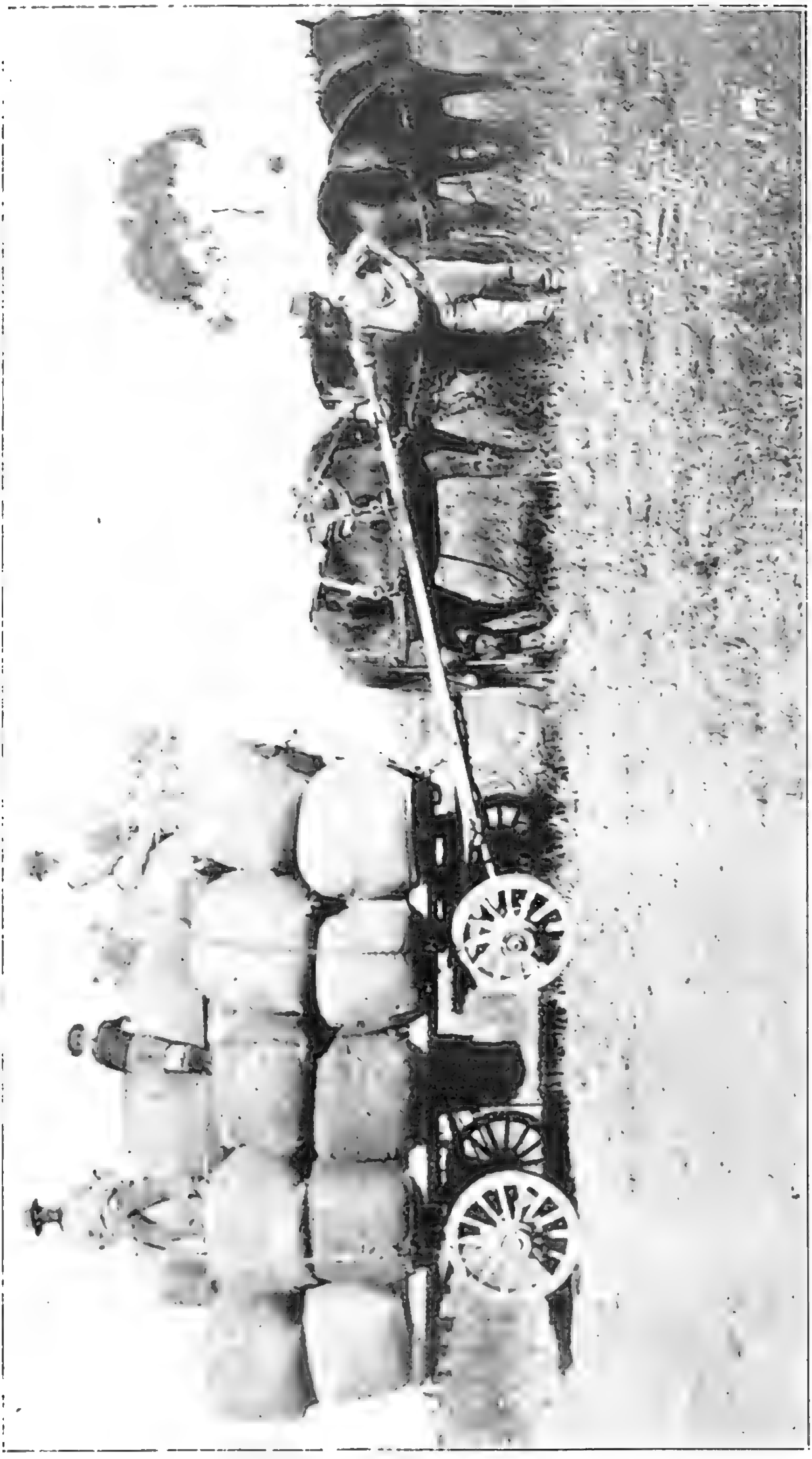


PLATE 25.—A CONSIGNMENT OF COTTON GROWN BY THE CHARTERS TOWERS COTTON COMPANY.

General Notes.

Wheat Pool Act.

The provisions of "*The Wheat Pool Act of* 1920" have been extended, by Proclamation, to include wheat harvested during the seasons 1925-1926, 1926-1927, and 1927-1928.

Atherton Pig Pool.

The period during which the Pig Pool, dealing with pigs grown in the petty sessions districts of Atherton, Herberton, and Chillagoe, shall be in operation has been extended to the 31st December, 1925, and the members of the present Pig Board will hold office until that date.

Fruit Marketing Organisation Act.

Regulation 70 of the regulations made under the Fruit Marketing Organisation Act has been altered. The old regulation provided that all members of local associations would be entitled to attend the annual conference of fruitgrowers convened by the Committee of Direction. The new regulation provides that all members of local associations are entitled to attend the conference, but each local association must appoint a delegate to speak at the conference, which delegate shall exercise the one vote to which each association is entitled. The delegate mentioned must be supplied with a certificate signed by the secretary and chairman of his association.

Sugar-cane and Power Alcohol.

The Minister for Agriculture (Hon. W. Forgan Smith), in referring recently to a Press telegram from Cairns respecting a meeting that had been held at Gordonvale in connection with power alcohol, pointed out that it is stated in that message that "The figures prepared by Mr. Howe in support of the scheme were exhaustively checked by the chemists present, all of whom were satisfied from the power spirit point of view as to their correctness, and were submitted to Mr. De Bavay and met with his approval." With regard to the foregoing Mr. Forgan Smith stated that he had received a telegram from Mr. McWalters, the chief chemist in charge of the Sugar Experiment Station, Innisfail. In this telegram Mr. McWalters reported that he had attended the conference at Gordonvale on Monday at the request of the local Power Alcohol Committee, that he had disagreed with Mr. Howe's and Mr. Hunter's figures, and that Mr. Howe had finally stated that only 25s. could be paid for cane if converted to alcohol with molasses included. It will therefore be seen that the message, as wired from Cairns, is misleading in so far that it indicates that all the chemists present at the meeting were satisfied as to the correctness of the figures submitted.

The Budget and Income Tax.

Wilfred T. Fry, Buckingham Palace Gardens, London, S.W. 1, writes:—Residents in Australia deriving any income from Great Britain will be delighted at the new Budget, as the income tax remissions are very real. Briefly, they are as follows:—

> Reduction in the standard rate of tax from 4s. 6d. to 4s. in the £1. Relief to "earned" incomes increased from one-tenth to one-sixth. Treatment of all income of persons over sixty-five years of age as "earned" where total income does not exceed £500. In the case of married persons this applies if either spouse is of the age stated.

The following instances will show the reductions more clearly. It is assumed in each case that a married couple without children is concerned:—

Income.	Last year's tax.	This year's tax.
£	£ *s.* *d.*	£ *s.* *d.*
300	5 1 3	2 10 0
400	15 3 9	10 16 8
1,000	126 11 3	99 3 4

Primâ facie it would not appear that in the case of income "earned" in Australia the amount of repayment on the British "investment" income would be affected, but, owing to the peculiar nature of the rebates allowed, extra relief is, in fact, given to persons not resident in the United Kingdom.

A School of Co-operation.

Everyone who had experience of the organisation of new and improvised army formations in the course of the world war appreciates the value of courses of intense technical training. In the back areas in France Schools of Instruction were established, not only in the handling of modern weapons, but also in the more prosaic arts, such as field cookery. Officers and men were selected from time to time to enter these schools of intense training, with the result that the all-round efficiency in the several arms and services increased tremendously. Something of the same kind has been introduced by Mr. Murray, the Principal of the Agricultural High School and College at Gatton, in his tractor schools for farmers. In the United States a School of Co-operation has been established with the motto: "Co-operation at better farming together, better business together, better living together—a prosperous agriculture and a high standard of living for farmers without loss to the nation." Before us is the prospectus of the institute, which offers—"A source from which members, employers, and officers of co-operative marketing organisations, teachers of marketing universities and colleges, public marketing officials, and private and public research workers will be able to secure training. Practical experience and knowledge will be pooled for mutual benefit and the advancement of sound co-operation. The Institute will serve to clarify thought concerning the real goal of co-operative endeavour; to analyse the experience thus far accumulated, and to develop leaders and workers who can effectively serve the future needs of the movement. The whole spirit in which the Institute is conceived is that of the social and economical welfare of the nation."

A list of participating bodies includes some of the largest organisations in connection with the grain, cotton, dairying, fruit, and vegetable industries of the United States, as well as the American Farm Economics Association, the American Farm Bureau Federation, National Board of Farm Organisations, and the American Committee on the International Institute of Agriculture in Rome.

The syllabus given for each week of the first educational course of the Institute is:—

First week.—Economic Principles and Legal Structure of Co-operation: History of Co-operation; Ideals of the Movement; Development of Types; Possibilities and Limitations: Status of State and Federal Legislation; Education in Co-operation.

Second week.—Organisation and Membership Problems: Preliminary Market Surveys; Forms of Organisation; Organisation Finance; Patronage Costs; Educational Work with Members; The Co-operative and the Community.

Third week.—Operating Methods and Management Problems: Source of Personnel; Business Practices; Auditing and Accounting; Marketing Finance; Warehousing; Grading and Standardisation; Methods of Pooling.

Fourth week.—Sales Policies and Price Problems: What is Meant by Orderly Marketing; Selling Plans for Principal Commodities; The Development of Markets; Price Objectives of Co-operatives; Selling Problems; Credits and Collections; Effect of To-day's Price on To-morrow's Production.

Co-operative Marketing—Building from the Bottom.

A recent issue of "Hoard's Dairyman" contains the following suggestive references to the principles of co-operative marketing:—

Hon. Frank O. Lowden, president of the Holstein-Friesian Association of America, is devoting splendid services to the co-operative movement. He appreciates and understands the full meaning of co-operative marketing and why more farm products should be prepared and marketed by the farmers themselves. He recently made the following statements in an address before a meeting of co-operative marketing associations in Washington:—

"If you want to see the day when the grand old yeoman stock of our country shall be replaced by the peasant and all that the peasant implies, then resign yourselves to marketing conditions so unfair, so unscientific, so largely based on speculative greed that it makes a large crop worth less in the aggregate than a small crop. Take cotton as an example. Increase the yield less than 5 per cent. and you decrease the price 20 per cent. Is there any justification for such a system of marketing as that? Under any just, sane, or sensible system would that sort of paradox be possible?"

He recognises that the co-operative marketing movement has encountered discouragement and failures, "but failures are always," he declared, "an incident of progress."

President Coolidge agreed with him, saying: "Firmly as I believe in the broadest and soundest programmes of co-operative marketing, I want to make plain

that I am no blind believer in any magical attribute of the co-operative procedure. A good deal that is positively mischievous has been put out in this regard. There is a school of co-operators who seem to believe that the programme can be started at the top and built downward. They want the Government, or the banks, or philanthropics, or Providence to lay out a scheme big enough to cover the country, set its machinery moving, guarantee it all needed capital, and then invite the farmers to sit in the places reserved for them and proceed to project. I want to see society as a whole help, but I want to see the farmers do their share, and I warn them that this will be the lion's share.''

''Let me illustrate,'' continued President Coolidge, ''by the analogy of a great industrial organisation. The United States Steel Corporation could never have been started from the top, and all at once. It had to be started in hundreds of places and forms, and over many years. The industry had to come first, its consolidation afterward.

''Mr. Carnegie built one great section of it; other men, in all parts of the country, founded other sections of it. It is hardly conceivable that any of these men in the early and formative years could have visioned the enormous concentration to which their activities were tending. They were not thinking of that. They were founding the industry in all its branches and ramifications, in all parts of the country, in a vast variety of corporate forms.

''These widely scattered and seemingly unrelated units at last were brought together under a common control into a unity of management and policy.''

The first steps the President thinks co-operators should take are—(1) Establishment of grades and standards, (2) encouragement of good and elimination of poor varieties, (3) increase in the efficiency of production, (4) provision of a unified product adapted to its market, (5) organisation of distribution, and (6) creation of confidence in products and methods.

Cotton-Growing—Experimental Work.

The Director of Cotton Culture (Mr. G. Evans, M.A., C.I.E.), in communicating to the Press an account of a recent tour in the Upper Burnett district, said that the chief work had been the selection of Durango pure seed cotton. The small demonstration farm on Monal Creek had served a very good purpose in showing the new settlers the best way to grow cotton. Having taken full advantage of the advice and experience of the farm manager (Mr. Clark), the cotton-growers in this area, many of whom had never grown cotton before, had been able this year to plant the right class of land, sow the seed at the right time, and space the rows correctly. They also had paid correct attention to thinning-out and after-cultivation. The result was that this year cotton from the Upper Burnett settlement was the best in Queensland. The season was very favourable for the thorough preparation of the land, and wide spacing enabled the cotton to weather the heat wave. Very little immature cotton, so much in evidence in other parts of Queensland, was to be seen in the product of this district.

Experiments had also illustrated the fact that Durango cotton, when thus properly cultivated, was an exceedingly heavy crop. The yield from 21 acres on the Monal farm, which included 3 acres of late-sown experiments, which would give no yield, owing to the frosts, had returned a total of 10 tons, or more than half a ton to the acre. In one experiment, for an acre planted in the first week in October, the yield was 2,200 lb. of seed cotton to the acre.

Equally good results were being obtained by some of the settlers, and there were some fine picking tallies. Two daughters of Mr. J. T. Clug, a selector near Monto, had picked 404 lb. of seed cotton in a day. Obviously this was from an exceptionally heavy crop. Some interesting results had also been obtained at the demonstration farm at Biloela (formerly the Melton demonstration farm), in the Callide Valley, although practically no rain had fallen since the new year.

Twelve acres on the last experimental farm were ploughed out last May and kept fallowed through the winter. In spite of the unfavourable season, this block had averaged over 1,200 lb. of seed cotton to the acre. An adjacent block, which could not be ploughed till August, because virgin land had been opened up, yielded little more than 650 lb. to the acre. A better demonstration of the value and necessity of winter fallowing could not be desired. Durango required proper cultivation to obtain the best results; but where it had the advantage over ordinary mixed cotton was that every plant in a row of Durango cotton gave an even yield, whereas from 15 to 20 per cent. of the plants of the ordinary varieties gave no yield at all.

The old Queensland mixed variety was becoming exhausted and was degenerating very rapidly. It was not only failing to yield heavily, but the quantity was most

unsatisfactory, and had been adversely commented upon by several prominent spinners in England, who had given our cotton an extensive trial last season. The only hope for the industry, therefore, was forthwith to raise cotton from a pure variety of good quality, and the only such seed they had at present available was Durango. Special care had been taken this year to keep the pure Durango seed from the various districts quite distinct, so that acclimatised seed will, as far as possible, be sent to the same districts again this year.

The department was experimenting with other varieties, including Acala, which seemed to be of great promise. Only a limited quantity of this seed was available this year, but it was proposed to arrange for isolated test plots of it in different parts of Queensland in the coming season, with the object of propagating the seed and introducing it into suitable areas in the future.

The Food we Eat—The Value of Vitamins.

The food we eat, and the selection which should be made, were amongst many matters dealt with recently in lectures by Messrs. J. B. Henderson, F.A.C.I., Government Analyst, and L. A. Meston, A.C.I., under the auspices of the Health Association of Queensland and the Australian Chemical Institute.

Both lecturers pointed to the care which should be exercised in the selection of food, especially for the infant, and to the need for choosing those diets which were rich in vitamins. Many popular diets which appealed so much to the palate were lacking in the nourishing properties so necessary for the health of the human body, and the lecturers gave valuable advice as to the best foods to be eaten, such as milk, fruit, eggs, and vegetables.

Mr. Meston, after pointing out that no nation in the world had a better food supply than Australia, asked whether it was being used to the best advantage. "Is there not," he inquired, "room in our wealthy Commonwealth for a National Board of Nutrition? Such a board would be composed chiefly of eminent biological and physiological chemists, whose duties would include research work in regard to nutrition, the framing and operation of food and drug standards, and the dissemination of accurate knowledge to the people relative to dietary problems. Someone shrieks that cancer is due to a deficiency of the 'B' vitamin, or the consumption of tomatoes, or deficiency of potassium and lime in the food, or the drinking of paraffin oil, or a surplus of cockroaches, and nervous people grow more nervous, and much harm is done. But the report is broadcasted without correction or contradiction from any authoritative source. We are called upon to gorge ourselves with this food and that food—food deficient in vitamins and more or less indigestible, and no competent voice is heard advising the nation not to make an ass of itself by bringing disaster on its beautifully adjusted and efficient internal laboratory."

Mr. Henderson dealt with the importance of milk in the feeding of the nation, the health of which, he said, also was affected by the absence of vitamins in its general diet.

"The institution of nutrition clinics in some American schools has been a great success," he continued. "Children not up to the standard of weight in relation to age and height, or otherwise showing signs of malnutrition, were given instruction in a special class as to the kinds of food to be eaten or avoided. They were also taught how to take care of their bodies. Their homes were visited and the parents similarly instructed. Fifty-seven per cent. of these children gained weight at 1.7 times the average rate, and 22 per cent. at about the normal rate. The children took a keen interest in their increasing size and strength, and the good results were obtained under most adverse conditions. If such results were obtained in America, surely there is room for improvement in Queensland. In spite of the wonderful climate and the ease with which fruit and vegetables can be grown, undeveloped and backward children, from the physical standpoint, are common. Certainly not so common as in the older countries; but we should be much further ahead of them than we are, considering what Nature has done for our environment."

The Town Beautiful and the Trader's Bank Book.

One of the ways in which a traders' association in any town can be most useful is for it to devote its energies collectively and individually to the making of the town so attractive that people will want to come and live in it and will not want to leave it. The creation of a strong civic pride, and such a strong attachment to the locality that people will get homesick when they leave it, means a big increase in the trader's turnover. The fostering of a pleasant social life, of home hospitality, the general introduction of sports and the pleasures of life, all mean a much wider

and more generous circulation of money, from which the traders of all classes must benefit. Individual business men should make their stores as attractive as possible with up-to-date fronts and artistic window and interior decorations, so that the people will feel proud of their shops.

A certain proportion of the population of any district desire to make as much money as they can and then leave the place. If an association were formed under some such title as the ——— Garden City Association, to keep always before the community the possibilities of beautifying the place and improving its facilities, it would not be very long before a great transformation in public opinion and civic pride would be effected. To begin with, if the whole of the streets were finely laid out with beautiful shade trees and lovely gardens, as is the case in some Australian and many American towns, it is certain that the value of property all round would increase. An association giving its attention to this subject would encourage the cultivation of flower gardens in front of every dwelling, and perhaps be able to arouse rivalry, not to have the most expensive plants, but the best-kept and the prettiest gardens. This association could work in this matter with the horticultural society and with the school committee. In the Seychelles one of the main streets is lined with a beautiful avenue. Bougainvillea growing up most of the trees makes a gorgeous sight when it is in flower.

A garden city association should study what is done in America by the Good Roads Associations, and in England by the Garden City Association, and it would soon get ideas which could be put into practice at very little cost, and which would in a few years make the place known all over Australia as one of the most attractive residential places. It is not suggested that the municipal council should undertake this work; the great thing is to create a personal and patriotic interest in the town itself on the part of the residents and of the association. This is an outline of one form of enterprise which would benefit every town in Australia if only people would take it up and consider it. To carry it out it is necessary to have public opinion. Acts of Parliament have no effect unless public opinion is behind them, and if public opinion has been aroused Acts of Parliament are not necessary.

Public parks and recreation reserves, well laid out and beautified, are an asset not properly valued. Proper accommodation at showgrounds for entries and visitors from other districts, a sufficiency of pavilions and courts, cricket pitches and other facilities for the holding of big tournaments, which bring many strangers to the town, and keep them there for many days, is a paying proposition, because of the money spent by the visitors and by the inhabitants eager to make a good impression. Indirectly the district is being advertised in the best way, and given that progressive, comfortable appearance that will influence families to come and live there.—In the "Australian Forestry Journal."

Success in Wheatgrowing—Some Essential Factors.

"What are the factors for success in wheat cultivation under such conditions?" asks Dr. A. E. V. Richardson, in the Journal of the Victorian Department of Agriculture, after traversing in brief the climatic features of the main wheat-growing districts of the Southern State. "From the point of view of maximum production of wheat per acre," he proceeds, "we may say the following are essential:—(1) Conservation of soil moisture by early fallowing and thorough working of the soil. (2) Liberal manuring. (3) Regular crop rotation and association of sheep with wheat-growing. (4) Rational use of seed." The following paragraphs are taken from the writer's comments on these points:—

Fallowing Pays.—It is a matter of common observation that well-fallowed land in our wheat districts will grow bushels more wheat per acre than land that has been merely stubble-ploughed. Various experiments in the drier parts of the wheat belt, as well as the practical experience of farmers, have both conclusively demonstrated that more wheat can be grown over a period of years on a given block of land by cropping it every other year than by growing wheat continuously on the same land every year.

It is often stated that the continual practice of bare fallowing deprives the soil of organic matter—the soil's most valuable constituent—and therefore it may be supposed that bare fallowing will gradually impoverish the land. If the land is impoverished, the fault lies not so much with the practice of bare fallowing as in growing too many grain crops and carting them off the farm instead of growing them in rotation with forages and pasture for feeding down by sheep and lambs.

With the adoption of judicious rotation there need be no fear that the practice of fallowing will ultimately result in soil depletion.

Summer Fallowing.—Summer fallowing has become a common practice in the Wimmera. The black clay loams, which constitute so large a proportion of the Wimmera, are well suited to the adoption of this practice. The land to be prepared for fallowing is skim-ploughed in February or March, or in some cases it is disced. A loose mulch is thus formed on the surface, which not only conserves the moisture, but assists the rapid germination of the weeds with the first rains. In July and August, after seeding is completed, this summer-fallowed land is re-ploughed or scarified. Such land as is ploughed late in spring is immediately worked down with a scarifier or harrows to conserve moisture and eliminate weeds. From spring until the following autumn the land is kept in a friable condition by scarifying or harrowing as often as is necessary to preserve the mulch.

Thorough tillage—which has as its aim: (1) Preservation of a loose mulch; (2) fining and firming the seed-bed; (3) destroying weeds; (4) promoting aeration and bacterial activity—is essential for successful cultivation in regions of low rainfall.

A fine illustration of the value of thorough tillage is shown in the results of the manurial tests at Longerenong. The unmanured plot at Longerenong for a ten-year period averaged 29½ bushels, a yield more than double the average of the State of Victoria.

Humus.—The outstanding weakness in Victoria's system of wheat culture, Dr. Richardson goes on, is that in many cases little or no provision is made for the restoration of organic matter. It is well known that the losses of organic matter due to fallowing in an arid climate are very considerable. The fertility of the soil depends very largely on its organic portion. Deprive the soil of its organic matter, and you have rock dust.

Organic matter might be restored in three ways—(1) Application of stable manure; (2) ploughing in of green manures; (3) pasturing the land and feeding down forage crops with stock. The two former methods are impracticable on wheat farms. The introduction of pasture into the rotation or the feeding down of forage crops with sheep is, however, entirely practicable.

Crop rotation leads to more healthy crops. Take-all, flag smut, and other fungoid diseases are much less common on land on which a regular cropping sequence is maintained. It enables the farm work to be better distributed through the year, more sheep to be kept, and it assures a heavy wheat yield.

Sheep and Wheat.—The association of sheep with wheat-growing presents many advantages. The sheep utilise roughage on the farm which could not be otherwise used for profit. They do well in the stubbles of the wheat crop, utilise the herbage of the lay land, and keep the fallows clean and well consolidated.

They work in well with wheat, for the maximum demands of a flock of ewes with their lambs are made when there is a flush of spring herbage, and the lambs are usually sold before the grass begins to go off. They utilise the herbage on the fallows and assist in bringing about that consolidation of the seed-bed so necessary for a successful wheat crop. This is of importance in country which is light in character. They assist in maintaining the fertility of the farm, for much of the phosphoric acid, potash, and nitrogen found in the herbage is returned to the soil in the droppings of the sheep. This is especially true of a flock of mature animals.

With the establishment of the fat lamb industry on a sound and profitable basis, and the high prices ruling since the war for wool—both crossbred and Merino—the keeping of sheep on the wheat farm has become a matter of great importance.

Seed.—In order to get the best results from early fallowed, carefully worked, properly rotated, rationally manured land, the seed sown should be the best the farmer can secure.

The first requirement is to secure varieties suited to the district. The farmer has a large number of varieties to select from, and he should study carefully the yields of local experiment plots conducted by the Department of Agriculture, and even test a few varieties on a small scale. The experience of farmers in the district, and the results of district experiments, will be invaluable in arriving at a selection of, say, two or three types.

The farmer should endeavour to raise his own seed, and occasionally secure seed from the Department.

Experiments have shown that it pays to grade wheat for seed.

Finally, seed wheat should always be "pickled."

Fruit Marketing Organisation Act.

Regulations 73-77 of the Fruit Marketing Organisation Act have been altered in order to give more equable representation to fruitgrowing districts on the various Sectional Group Committees.

Cotton Standing Committee Dissolved.

The Cotton Standing Committee of the Council of Agriculture, consisting of Messrs. G. E. McDonald, R. J. Webster, J. McRobert, J. Hardcastle, and T. C. Hayes has been abolished, as from the 6th June, 1925.

Peanut Board.

An Order in Council has been approved authorising the Peanut Board to give security over any peanuts delivered to the Board in respect of any advances made to the Board for the purposes of the Primary Products Pools Act.

A Home-Made Dipper.

A dipper which will be found very useful for many purposes about a dairy may be made from a 2-lb. preserved fruit can. The lid should be carefully removed, and any rough edges left by the tin-opener carefully filed smooth with the aid of a half-round file. Care should be taken to preserve the rim round the outside top edge, as this adds strength to the sides. Afterwards the bottom and side seams might be lightly filled with solder and a handle attached. This may be made with a suitable length of tin, having the two edges lapped over a couple of pieces of wire of light gauge. The handle, after being given the desired shape, with the folded edges inside, should first be soldered near the top edge of the can and the lower end 1½ inches above the bottom edge.

Organisation—What Southern Citrus Orchardists Have Done.

Four years ago the citrus growers in New South Wales were entirely unorganised. During the coming season, stated Mr. H. R. Hallard, manager, New South Wales Central Citrus Association, Ltd., in an address before a conference of co-operative bodies held in Sydney recently, there will be eleven, or possibly twelve, co-operative packing-house companies operating.

The largest (at Gosford) packs over 100,000 cases, the smallest probably 10,000 cases, the average pack being in the vicinity of 30,000 cases. Until last year, all the companies were formed under the Companies Act, but since the passing of the Co-operative, Community Settlement, and Credit Act, 1923, new ones have registered thereunder, and practically all of the others are re-registering under the new Act. Membership is limited to *bonâ fide* fruitgrowers in the particular district in which the company is formed, and members on joining are bound for varying periods, usually two years, to send the whole of their production of citrus to the packing-house for grading, packing, and marketing. In the event of a member breaking his agreement, there is a penalty imposed for every case marketed otherwise.

Modus Operandi.—At the beginning of the season an estimate is made by the management of each member's crop, and during the season a system of picking orders obtains which ensures regular supplies in such quantity as may be required by the management for the economic running of the shed, though periodically, according to the state of the market, supplies are increased or reduced as circumstances show to be desirable. Where possible, this system of picking orders is made as elastic as possible to prevent individual inconvenience. The companies are absolutely democratic in character. Shares are allotted on a fixed basis according to the acreage, but voting is usually on the "one-man-one-vote" principle, though occasionally in some companies up to three votes are allowed in proportion to the acreage of individual members.

The control of a company is invested in the directorate, or, as it is sometimes called, committee of management, which is elected annually from the members, and this executive is responsible for the conduct of business. It appoints a proper manager and staff to carry on the work, but is itself responsible for the policy and the proper carrying out of the work. The whole of the capital is issued only to *bonâ fide* members—that is, no outside capital is permitted, as this might eventually result in the control of the house slipping into other hands.

Share capital is usually paid off over the period of membership in the initial stages, most of the money being borrowed from a bank (generally the Rural Bank)

on the security of the fixed assets, uncalled capital, and limited guaranties of members.

The fruit is transported loose by members to the packing-house, where it is graded, sized, packed, and marketed by the company under the packing-house label. Usually four qualities are made, the designations being—(*a*) Extra choice, (*b*) Choice, (*c*) Standard, and (*d*) Graded. In addition, the "count" in each case is noted, and thus on the label attached to one end of the case is shown the variety, the grade of the fruit, and also the number of pieces contained. Standardisation of pack is strictly enforced, so that the buyer knows that the quality of, say, "Choice" grade from a certain house remains the same throughout the season. Such standardisation of products is vitally necessary for the successful marketing of the crops, and all the existing houses watch this point very closely.

The Central Association.—During the first two years of the agreement the few companies that had pioneered it worked separately, but two years ago they formed the New South Wales Central Citrus Association, situated in Sydney, which is, in reality, simply a federation of the packing-house companies. Its members can be only co-operative citrus packing-houses or very large individual growers, who may have the quantity of fruit and plant which permits of their marketing up to similar standard to a packing-house.

The Citrus Association is, like the packing-houses, a truly democratic organisation, and non-profit in character. It is financed by a small levy—at present 2d. per case on the total production of each packing-house member. Briefly, its duties are to build up for its members a scientific system of collective marketing, supply regular advices from all markets, organise new packing-house companies, and watch matters generally affecting the citrus industry, with a view to such combined action as may be necessary for its defence. By co-ordinating the activities of the individual houses, it provides the power and efficiency in scientific marketing which would otherwise be lacking if all the houses were working separately. It does not control, but guides and directs, by accurate information and advice, the organised units in the disposal of their products in the various Australasian and oversea markets. In addition, it voices authoritatively the views of growers on all questions connected with their interests.

The total pack of the combined packing-houses for the season just coming on is estimated at from 350,000 to 400,000 cases.

Co-operation in the South—Farmers' Increasing Interest.

An increasing practical interest in co-operation is reported from New South Wales, and that the beginnings of an extensive rural co-operative development are widely apparent. Such a growth must inevitably be slow if it is to be sure, for the soundest and most durable co-operative organisations have been found by experience to be those which have been well considered and carefully constructed, following good models. It is, therefore, a favourable augury for the future of co-operation that, instead of a spectacular increase in the number of societies, there has been a sustained growth.

In the five years preceding 1924 the average annual number of co-operative societies registered was thirteen. In 1924 there were registered twenty new societies, and for a period of less than three months in 1925 six were registered. These figures exclude companies reconstructed as co-operative societies. The greater part of the increase has been due to the formation of rural co-operative societies, twelve of the societies registered in 1924 and three registered in 1925 being of this class. But beyond this growth of registered co-operative organisations, quiet trading activity of a co-operatve nature is steadily increasing among men on the land. Pool buying, joint consignment of produce, organisation for the sale of produce direct to the consumer, the construction of group sheep dips, the joint purchase of utilities, such as machines or vehicles, and kindred activities are all becoming more and more popular. Success achieved by one little organisation is usually imitated by others, and so the benefit is distributed. This is excellently exemplified in the increase of group sheep dips. Thus, in many ways, the primary producer is learning the practical advantages of co-operation, and is gaining experience in the conduct and control of co-operative business ventures which will be of inestimable value when it is decided to embark on large-scale co-operative undertakings.

The success of co-operative organisation is being exemplified on many sides. It is being recognised that by this means farmers obtain greater bargaining power in their business dealings, and the use of utilities on their farms which they could not obtain by their individual efforts.

Fat Lambs for Export—The Supply Problem.

The first necessity to the proper development of a market for fat lambs from Australia, said the Hon. A. G. Manning, Chairman of the Australian Meat Council, recently, was continuity of supply. It was most disconcerting for the agents in London, who were endeavouring to develop a market there for Australian lambs, to find, after there had been a steady supply for some little time, that there were no more lambs coming forward, and that, in consequence of a dry season or something else, there would be no more for some months. It was absolutely essential to go in for fodder-crop growing and for the conservation of fodder with a view to ensuring regularity of supply.

In New Zealand the Meat Board had power to control the export, with the result that they were able to avoid periods of over supply on one hand and of insufficient supply on the other. Moreover, New Zealand lambs were largely exported on consignment, the grower retaining his interest in his lambs right up to the moment when they were sold to the retail shopkeepers. The consequence was the New Zealand farmers got the full advantage of a rise in the market. The Australian Meat Council had no such power, and the grower was dependent altogether on the speculator, who made all the profit by any rise in the market.

What had to be learned in Australia was to supply what was wanted by the market. He was no doubt treading on dangerous ground in making any forecast about primary products, but he believed there would always be a keen demand for lambs. Mutton was a necessity in Great Britain, and the price was low, but lamb was a luxury, and there appeared to be every reason to anticipate that the price would always be good, and also that the demand would be steady.

There were also serious handicaps to be overcome at the London end. There was the prejudice against frozen meat. He recalled a dinner given in London by a gentleman interested in Australian trade, who, in order to show the prejudice against frozen beef, procured the best Scottish beef for the table, but announced that it was Australian frozen. The guests considered that everything at the table was excellent except the beef, which they said had manifestly been driven a long distance to the killing works! Then there were the high prices demanded in respect of the whole cargo of frozen meat in the Port of London, once the ship's hold was opened, even though the quantity removed from the hold was small. On the other hand, lamb and mutton, being always frozen, had a great advantage over chilled beef, in that frozen meat need not go into consumption immediately as must chilled meat.

Feeding Calves—Three Prime Essentials.

In the feeding of young calves there are certain things to which too much importance can hardly be attached. The first is the need for scrupulous cleanliness with the feeding vessels. The buckets should be scalded thoroughly every time they are used, and so also any feeding apparatus used. The second is absolute regularity as to feeding time, and the third absolute uniformity as to temperature.

Neglect of these last two things has more to do with calves' troubles than many people have any idea of. Indeed, it is surprising how many farmers have never contemplated them as factors of any consequence in calf-rearing. A healthy regularity is likely to be promoted by feeding at the same time every day, while varying temperatures are obviously detrimental to the delicate tender organs of the alimentary tract. Attention to the last is most necessary where a number of calves have to be fed, or where the weather is particularly cold. Many very successful rearers of calves insist on having boiling water available during the whole time the calves are feeding, so that a little can be added as required to keep the milk ration up to blood heat. It is not necessary to use a thermometer to test the temperature, for a skilful feeder can tell by dipping his finger in the milk, although it must be remembered that on a very cold or frosty morning the milk will feel warmer than it really is if the fingers are very cold.

As the calves grow they should be encouraged to eat as much roughage, such as hay or chaff, as possible. The effect is to develop the barrel and increase the capacity of the digestive organs for dealing with large quantities of food and turning it into milk. This development of the digestive organs can be begun with little difficulty while the animal is young, but it is practically impossible to modify the shape and conformation of a heifer that has been neglected up to the time she is, say, twelve months old.

Treated on the above lines, little trouble will be experienced in the way of "scours."

Staff Changes and Appointments.

Constable D. J. Gavin, of Bell, has been appointed an Acting Inspector of Stock.

Messrs. K. Hunter, V. T. Barkla, and P. J. Richards, Prickly-pear Rangers, and Mr. J. F. G. Toft, Land Office, Bundaberg, have been appointed Inspectors, Agricultural Bank.

Mr. W. C. Roberts, late Lighthouse-keeper at Caloundra, has resigned his position as Officer under and for the purposes of the Animals and Birds Acts, and Mr. A. J. Gosling, the present Lighthouse-keeper, has been appointed in his stead.

Messrs. A. F. H. D. Singh and J. T. Smallhorn, Inspectors of Stock at Julia Creek and Caloundra, respectively, have been appointed Inspectors of Slaughter-houses.

Mr. F. C. Schubert, of Porter's Gap, Burrandowan, has been appointed an Acting Inspector of Stock.

The appointments of Messrs. L. W. Ball and S. T. J. Clarke, as Managers of the Cotton Experimental Farms at Melton and Monal Creek, respectively, have been confirmed, as from the 13th November, 1924.

The appointment of Mr. N. E. Goodchild as Senior Field Assistant, Cotton Section, Murgon, has been confirmed, as from the 2nd November, 1924.

The appointments of Messrs. M. D. O'Donnell, G. F. E. Clarke, and P. A. Kelly as Dairy Inspectors at Gympie, Ipswich, and Oakey, respectively, have been confirmed, as from the 1st November, 1924.

The resignation of Mr. F. G. Holdaway, B.Sc., as Assistant Entomologist, Cotton Section, has been accepted, as from the 20th June, 1925. Mr. Holdaway has been appointed to lectureship at the Adelaide University.

Constables B. F. Brennan and D. Ferguson, of Selwyn and Irvinebank, respectively, have been appointed Inspectors of Slaughterhouses.

The following have been appointed Assistants to Cane Testers at the Mills respectively set opposite their names:—W. J. Richardson, Millaquin; Miss M. Bennett, Nambour; T. V. Breen, Farleigh; Miss J. O'Flynn, Marian; Miss F. Foubister, Plane Creek; H. T. Witcher, Maryborough; W. B. Powell, Pleystowe; and Miss E. M. Boddington, Bingera.

Mr. C. H. Jamieson, of Tent Hill, Gatton, has been appointed the Chairman of the Butter Board until the 27th April, 1926.

Cotton.

Proclamations have been issued declaring that all cotton plants which are the first growth after planting shall either be destroyed or cut down to within six inches of the ground level, and that cotton plants which are not the first growth after planting shall be destroyed before the 1st September, 1925, and all debris of such plants must be burnt before the 15th September, 1925.

The Royal National Show.

For years past the Royal National Association has promised annually that their coming Show would be the best ever held, and it must be admitted that the forecast has invariably proved correct. This year a similar prophecy is made, and, as quite a number of novel exhibits are booked in addition to the usual attractions, no difficulty should be experienced in making good.

The leading feature of this year's Exhibition will be the displays made by manufacturers. Over thirty different factories have secured space and many of them will submit working exhibits. A whole section of the annexe at the end of the building nearest to the Museum has been assigned to the manufacturers, who will stage a display of such intense interest that it is hoped it will result in many Queenslanders learning that in their own State goods equal to the best manufactured in other places are available.

Applications for space, both inside the buildings and on the grounds, are so great this year that, although the Show is still nearly two months off, applications for over 40,000 square feet of exhibition floor space have been rejected, notwithstanding that a new building is being erected measuring 52 feet by 150 feet. This additional covered accommodation has been allotted to the One Man Farms, Rural Schools, Farm Produce, and Apiculture exhibits.

Since last year three cottages having a frontage to Water and Costin streets have been removed and the space occupied by them has been converted into accommodation for dogs, and visitors will have to admit that more suitable accommodation for such purpose does not exist in any other showground in the Commonwealth.

Another building measuring 30 feet by 100 feet has been erected for housing motor cars and lorries, and the bar under the Ernest Baynes Stand has been enlarged to provide practically double the accommodation available last year, together with much better storage space. The dining accommodation on the grounds is receiving special attention and many alterations of a minor but important nature to the caterers are being undertaken. Access to the dining hall under the Ernest Baynes Stand has been provided by means of a stairway from the main road, to enable the general public to use this dining hall as well as those visitors who patronise the grand stand.

Entries are coming in freely, particularly in the butter and cheese classes. Everything indicates that the entries will be the best ever experienced.

Milk Goats—The Poor Man's Cow.

The breeding of milk goats has for a great many years been an important feature of the live stock industry in many European countries, but it has never secured a very strong foothold in Australia. With us the goat has always been, more or less, a subject of ridicule, for most people do not realise the economic possibilities of certain breeds or types that have been bred for many years along definite lines. In continental Europe goats are largely used by families unable to keep a cow, and a great benefit is derived by having fresh milk at hand at a low cost. In those countries the goat is often spoken of as the "poor man's cow." Interest in goat breeding is growing in Queensland. The fact that the goat will supply sufficient milk for the average family and can be kept where it would be impossible to keep a cow is beginning to appeal to many people, especially those living in the small towns and the suburbs of the large cities. Types of goats, their general characteristics, and their value as a factor in domestic economy will be discussed in a special article in the August number of the Journal.

A Distinguished Queensland Student.

Mr. F. G. Holdaway, M.Sc., of the Division of Entomology, has been appointed to an important lectureship at the Adelaide University. Going up from the Brisbane Grammar School, Mr. Holdaway took the Science course at the Queensland University and graduated with honours in Biology in 1923. Entering the Department of Agriculture and Stock he served under Mr. Henry Tryon, chief of the Division of Entomology, and, later, under Mr. Ballard, Commonwealth Cotton Entomologist. Until recently Mr. Holdaway was carrying out valuable research work on insects injurious to cotton. This year he attained the degree of Master of Science. Mr. Holdaway is well known on the sporting field, but it is on the river that he won particular distinction as cox for three successive years of the 'Varsity crew and afterwards as an oarsman. At a valedictory gathering prior to his leaving for the South every branch of the Department was well represented. A fine momento of his association with his fellow officers was presented to him by the Under Secretary, Mr. E. Graham, who paid a graceful and well deserved tribute to their guest.

Cows at Milking Time.

Few farmers fully appreciate the importance and value of systematic treatment at milking time. Far too often the cows are herded up to the bails by dogs—a habit that is most pernicious by reason of its effects on the animal's nervous system, with which the secretion of milk is most intimately connected. In the bails, too, they are treated gently enough in many cases, no doubt, but without method.

To get the best results the herd should be quietly driven up to the yards and kept there with as little to disturb them as possible. They should be milked by the same man in the same order every day, and they should be thoroughly milked out every time, on the principle that the more milk that is drawn the more the milk-producing organs are stimulated. A gentle and expert milker is worth a good deal. He can clear the udder with greater ease than a rough or less experienced person, and he will do it with more comfort to the cow.

Of cleanliness we have heard a great deal, and it is not necessary to repeat it all here, but the importance of clean hands, kept clean throughout the milking, and of wiping the udder and teats with a damp cloth before commencing to milk, may be once more emphasised.

After being milked, the cows should be passed straight out to pasture, and not turned back into the yard to wait till the whole herd has been milked. The effect is to avoid loss of feeding time, thereby enabling increased production, and to reduce the likelihood of injury by horning in the yard.

A Purebred Bull's Arithmetic.

"I am not strong on arithmetic," said the purebred bull, "but I can add to the bank account of the man who owns one; I can subtract from the principal of his mortgage; I can multiply his chances for success; I can divide his cares and worries; I can give more interest to his work; and I can discount his chances for loss."—"Live Stock Bulletin."

Educating Bush Children.

The Minister for Education (Hon. Thomas Wilson) quoted some interesting statistics relating to tuition of children in isolated localities by correspondence in the course of a recent public address. Three years ago, he said, the department inaugurated a departure—a correspondence school for children in isolated districts. It started with 27 pupils and 1 teacher, and had now reached an enrolment of over 3,000 with a staff of 34. The results had been extremely gratifying. Out of 18 pupils presented at the last examination 16 had qualified for entrance to a high school.

Primary Producers' Levy Regulations.

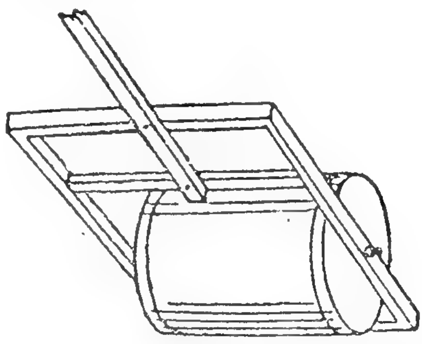
The Primary Producers' Levy Regulations empowering the Council of Agriculture to make levies on primary producers until the 30th June, 1925, have been extended to the 30th June, 1926. There is no alteration in the Regulations, but they will be known as "The Primary Producers' Levy Regulations, 1925."

Fruit Marketing Organisation.

The term of office of the present Committee of Direction of Fruit Marketing has been extended from June to August, 1925. Regulation 39 of the Regulations made under the Fruit Marketing Organisation Act has been altered. The regulation now provides for a fee of £1 1s. to be paid to Members of Sectional Group Committees for every day necessarily occupied in attending meetings or travelling to and from meetings, together with first class rail and coach fare instead of 10s. per day fee as previously provided.

HOME-MADE ROLLER.

The illustration herewith shows a handy roller. An empty oil drum was pierced in the centre at both ends, and a rod of half-inch round iron was driven through. The drum was then filled up with sand, and tightly corked. The wooden frame was made of 3 inches by 1½ inches hardwood, braced with hoop iron at the corners. At a little extra expense, a neat little roller can be made by cutting out the top of the drum, standing it on end, and inserting the iron rod in the centre of the bottom,



letting it run into the ground to keep it upright. The drum is soaped well inside, and then filled up with a mixture of one part cement, two parts clean sharp sand, and three parts gravel, mixed well, and moistened with water. This can be withdrawn from the drum, and will have a smooth outer surface, unlike the drum with its rims which mark the ground. A neat iron or wooden frame will make a very useful tool. The centre of the circular ends can always be found by taking one-half of the longest distance that can be measured across the circle.

Answers to Correspondents.

Care and Breeding of Pigs.

J.A.M. (Nambour)—

It is somewhat difficult to give advice unless an inspection of the stock and of the premises can be arranged. There are many causes for the troubles to which you refer, and to save repetition we are taking the opportunity to forward to you a number of pamphlets dealing with the subject. It seems that your system of feeding and handling the stock is more or less at fault, for there is no reason why pigs should suffer as yours have done if they are properly bred, fed, and handled.

Mr. Shelton, Instructor in Pig Raising, suggests that you cull out all your present stock and introduce new and better strains, and in this connection perhaps the Brisbane Show Stud Pig Sales would offer opportunity for purchase, but there will be a number of very useful breeding sows for sale by pig club members in the Nambour district, for some young sows were recently selected for this purpose. Of course, the trouble you will experience in securing suitable store pigs if you discontinue breeding must not be overlooked.

The Poland-China Pig.

C.H.S. (Murgon)—

The Poland-China breed of pig is one of which every breeder should know something. Mr. Shelton, Instructor in Pig Raising, is of opinion that the principal fault with this breed, if fault it can be called, is that it fattens so easily and on so small a proportion of food that, unless they are carefully handled and unless the breeder knows the type well, it is possible the breeding sows and boar will become overfat, and thus less prolific and profitable than they should be; but if we can feed two pure bred pigs on the same food as one mongrel or bush pig will eat, then that breed is worth while. We have not had sufficient experience of the Duroc-Jersey breed to make a fair comparison between them and the Polands, but from our experience the Poland-China can hold its own with any breed, and provided they are crossed with the Tamworth or some other flesh pig of similar type, good results may be expected at the bacon factory. We hope some day to be able to carry out experiments with these several breeds and their crosses, and to be able to publish results. The Duroc-Jersey is evidently destined to occupy a prominent place in our pig herds. We will be glad of your opinion later on, when you have had a fair chance to use your boar to advantage.

Sweet Potatoes as Poultry Food.

A.R. (Wondai)—

The Poultry Instructor (Mr. P. Rumball) advises:—From a comparison of the analysis of sweet potatoes, bran, and pollard, it will be readily understood that the former cannot displace bran and pollard as a poultry food, firstly because the proportion of carbohydrates to protein is too high; and secondly that the poultry would not consume a sufficient quantity, unless fed frequently, to obtain the necessary nutriment. They could, however, be used in conjunction with bran and pollard to the extent of 25 per cent. of the bulk of the mash, but slightly more meat meal should be added. In making the change, do so gradually and so accustom your birds to the change and the necessity for consuming a greater bulk.

ANALYSIS OF SWEET POTATOES, BRAN, AND POLLARD.

—	Water.	Protein.	Carbohydrates.	Crude Fat.	Ash.
Sweet Potatoes	71·1	1·5	24·7	0·4	1·0
Bran	11·9	15·4	53·9	4·0	5·8
Pollard	10·0	17·4	58·0	5·6	3·9

Sow with Milk Fever.

A.B. (Toowoomba)—

It is quite apparent that the sow referred to was not in normal condition for farrowing, and that her milk flow did not develop in time to allow of the suckers receiving a supply soon after birth, hence the sow was in a high fever, and as the young pigs would suffer as a result, they gradually weakened and died. Mr. Shelton, Instructor in Pig Raising, advises that the treatment given to the sow subsequently, however, has evidently had a healing effect, and there should be no future trouble either with the milk flow or the sow's ability to reproduce and successfully rear her pigs in future. It would, however, be a wise plan to see that the sow is kept in normal breeding condition (not too fat or too thin) prior to next farrowing date and, as a special precaution, which, by the way, is well worth adopting with every sow that farrows, to ensure that the sow has a plentiful supply of green lucerne or other green stuff, that she takes liberal exercise daily, that her bowels are kept in normal condition, and that three days before she farrows she is given three fluid ounces of castor oil in a warm bran mash as the first feed of the day. The best way to prepare this is to first of all secure about 1 qr. of dry bran, have this placed in a bucket, then measure out three tablespoonfuls of castor oil (ask your chemist for Ol. Ricini Ital)—*i.e.*, three fluid ounces—pour the oil into the bran in the bucket and mix well, then thin the mash down with warm water or milk to the consistency of thick cream. Add half a teaspoonful of ordinary table salt, mixing this into the mash. This bran mash will relieve constipation, and put the sow's bowels in good order. The treatment may be repeated, if necessary, without harmful result. Also see that the sow has no food at all during the day she farrows, but allow a sufficient supply of clean drinking water. Care at farrowing time amply repays the additional attention, and will frequently result in the saving of one or more pigs from being overlaid. The sow should be fed sparingly for a few days after farrowing and until her litter is about ten days or two weeks old, then gradually increase the food until the sow is receiving her normal supply. Any further information will be gladly supplied.

Pig Feeding.

L.M. (Innisfail)—

Mr. Shelton advises:—Farm crops such as lucerne, sweet potatoes, corn, sugar-cane, waste bananas, &c., are all suitable additions to the feed list to the growth of which you are particularly urged to give special attention, as the secret of success in pig raising lies in the production of the food on the farm. Molasses may be used more as a condiment than as a special article of diet—like sugar added to porridge—it is a heat and energy producer, but is not a flesh former, hence should only be used in small quantities from $\frac{1}{4}$ to $\frac{1}{2}$ or 1 lb. per day per pig from three months old upwards; its addition to coarse dry fodders is productive of much good. If no milk is available you may substitute cereal meals, barley meal, maize meal, &c., and water, but we would recommend you to consider dairying as well as pigs.

A.R. (Wondai)—

Mr. Shelton advises:—Sweet potatoes make an ideal pig food, particularly for use during winter months when other green foods are in short supply. They can be used in several ways, first by digging and feeding to pigs in conjunction with milk, and, in this case it is an advantage if possible to cook them. Secondly, they can be "fed off" by hurdling or temporarily fencing off a portion of the crop and turning pigs in, or you could arrange a combination of both methods. Jerusalem artichokes may also be used to considerable advantage in this way and these two crops with corn, pumpkins, and milk should supply a continuous rotation of food for use during the period stated. Dwarf Essex Rape and Skinless Barley we recommend as the most suitable green foods. If sown in February and March, or even up to the end of June, a good supply of green food will be assured for winter and spring months. Sow about 9 lb. of rape and 1 bushel of Skinless Barley.

Swamp Cancer.

A correspondent asks (1) The cause of swamp cancer; (2) is it contagious or infectious; (3) if either of the latter what remedy? Veterinary Officer, Mr. J. A. Rudd advises:—

(1) The cause is to a certain extent obscure, but is supposed in the first instance to be due to a small incised wound through the skin such as may occur when bullocks are running through the scrub, or small cuts from barb wire, &c. The irritation caused by flies, filth from muddy water holes, and other causes bring on proliferating growth of fibrous tissue, but there is little doubt that flies play an important part and are a factor to be reckoned with in the treatment.

(2) So far as is known at present it is neither contagious nor infectious provided it is as is described in reply to question No. 1.

(3) The affected animal if kept in a fly-proof stable and fed and regularly tended will in time make a good recovery with very little treatment. Actual cautery or searing with hot iron has been tried with a fair amount of success, especially if used in conjunction with a moderate amount of solution such as dipping fluids containing arsenic. But, so far, an application known as Sharp's Application, with directions for use as is sold by Surgical Supplies Ltd., has given the best results when applied as directed by the manufacturer, but would not be possible with wild bullocks running in the scrub.

Milk for Pigs—Is it Essential?

A correspondent writes:—I have a number of pigs of good quality. These I have been keeping in conjunction with dairying, but I have decided to devote my time to pigs and am anxious for advice as to whether pigs may be raised successfully without feeding milk, but by substituting farm produce and giving the pigs a good netted run. Peanuts, Jerusalem artichokes, and other crops of good-feeding value grow well in our district. The question is: Can I raise pigs successfully and profitably without feeding milk?

Mr. Shelton replied:—It is quite possible to successfully engage in pig raising without depending upon skim milk as a food for your pigs. Pigs can be maintained in good health and in satisfactory condition on cereals and cereal meal, root crops, greenstuffs (lucerne, &c.), and farm crops generally.

Pigs require ample supplies of good succulent food, a liberal supply of drinking water, and clean comfortable accommodation. The sties need not be expensive; as a matter of fact it would be well to devote the greater part of the cash available for this part of the farm to the provision of suitable pig paddocks and shelter sheds in preference to an expensive set of comparatively small sties. The type of shelter shed recommended was illustrated in the April issue of the Journal.

It is suggested that a list of questions on which special advice is required be supplied, when an effort will be made to give all the information available.

Pig Skin Trouble.

H.Y. (Wowan)—

Mr. Shelton, Instructor in Pig Raising, advises that it is apparent that the pigs are suffering either from the effects of infestation by hog lice, or from sunburn or sun scald, or some other skin trouble. Cocoanut oil is as good as any ointment for skin troubles, and if you ordered a 7-lb. tin from your storekeeper, this would give you a good supply for some time to come. Just render a small quantity down to soften same before use, and bottle as required. The other lice mixture we recommend is made up of ½ pint benzine, ½ pint kerosene, 7 pints fish oil. If this mixture is prepared as a standby, it will be found invaluable, and may either be sprayed on, or applied with a soft broom, or by hand. Another application should be given in about one week's time after first use, this to kill off the young lice that may have hatched out during the week. Flowers of sulphur and butter milk mixed to a semi-fluid paste is considered to be as fine a skin dressing as you could use. However, without an inspection of the stock affected, it is difficult to actually diagnose the complaint.

Re Green Bananas as a Food for Pigs.

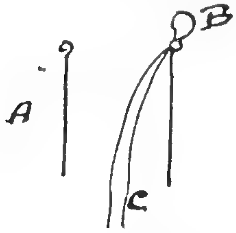
A.E.G. (Tandur)—

Mr. Shelton advises that waste bananas could be fed to advantage to pigs of all ages, but it is preferable in the case of immature fruit that they should be allowed to ripen somewhat before use, and that they should be cooked and fed in conjunction with some concentrated meal, say, like maize meal, barley meal, &c. They are too fibrous and indigestible if fed in the raw state, and whilst immature have little feeding value. We take it that the quantity available would be very limited, and that you would experience no difficulty in handling them to advantage. It would be preferable also to commence feeding them to mature stock, and to gradually accustom younger animals to them as opportunity offers.

Farrowing Difficulty.

"Pig Raiser" (Swan Creek).—No name and address given, otherwise a reply would have been given by return mail. Mr. J. A. Rudd, of the Veterinary Staff, advises:—

The sows in all probability were too fat and in addition suffering from constipation. Syringe out the lower bowel with a solution made up as follows:—One teaspoonful of salt, 1 pint of water (sterile rain water) bring it to a blood heat, and clear the lower bowel as much as possible. This will give the operator more room to work in. Flood the uterus with a solution of similar strength and temperature, and leave the sow alone for a few hours after having placed 7 grains of calomel (subchloride of mercury) on her tongue. The solution may be used to the extent of 2 or 3 gallons. If at the end of two hours there is no appearance of piglets, a blunt-ended instrument should be used, and in case of emergency such as this, a piece of No. 8 fencing wire with a small loop made at one end by bending the wire on itself may be used in conjunction with a loop of ordinary twine, which has been disinfected, which is passed through the loop thus—



A.—Loop of fencing wire.

B.—Loop of twine passed through the loop of A.

C.—Ends of the piece of twine.

The wire should be pushed gently into the uterus until the piglet's head is felt and the loop of twine passed over the head, the ends pulled tightly over the head, and the fœtus removed with the aid of gentle traction on the wire and the twine. This condition is always found in sows which are grain-fed or fed with boiled offal, and which are too fat and constipated for lack of exercise. If the sows were left running in the paddock they would have made their own bed, and farrowed normally. The sudden change from paddock to sties, especially if grain fed, will have the effect of bringing on constipation, and toxins loading up in the system will cause uterine inertia and difficult farrowing.

The following replies to questions on veterinary subjects were supplied by Mr. A. McGown, of the Veterinary Staff, in the course of the month:—

Blindness in Calves.

Case.—Two calves went blind. At first the eyes were very watery, and within a few days a bluish film formed over them. What is the cause and is there a remedy?

Reply.—The calves are suffering from ophthalmia, or inflammation of the eye, unfortunately too common in cattle. When first noticed it is always advisable to give a mild purgative to the affected animal; in calves such as those mentioned, 4 oz. castor oil should be given. The affected eye should be bathed daily with a tepid water for at least 15 minutes, and afterwards dressed with the following solution:—Nitrate of silver, 5 grains; distilled water, 1 oz. The best method for applying this lotion is to use a camel hair brush, but if this cannot be obtained a clean feather will do.

Ringing a Bull.

The actual ringing of a bull is a very easy matter, but he may be difficult to tie up securely, for a bull is a powerful beast. Some rope the bull by the horns to a fence or put him in a crush. There are two methods of ringing, one using a blunt copper ring, which is jointed in the middle and the ends are screwed together. In this case a piece of the cartilage of the nose is punched out by a special nose punch and then the copper ring introduced, and finally fastened by the screw. Or a trocar and canula may be used. The other form has pointed end for self-introducing—a practical but not so easy as the first method. The hole must be made in the septum of the nose where it is thin and not fleshy.

Castrating Bull Calves.

In general it is desirable to castrate bull calves as soon as the testicles are sufficiently developed to facilitate the operation. This may vary from a week old to two or three months. The most common practice is to do the work at from two to four months of age. A dry, cool day during a period when grass is plentiful should be chosen if possible, but the operation should not be delayed too long because of a lack of these conditions. A sharp knife (an ordinary pocket knife will do) and a bucket containing a 3 per cent. solution of some standard disinfectant are all the equipment necessary. The calf should be placed on his side, with an attendant holding him in position by placing one knee on the neck, one hand on the head, and drawing the upper hind leg forward with the other hand, so as to expose the field of operation. It is advisable for the operator thoroughly to cleanse his hands before beginning the operation, and frequently to immerse them in the disinfectant. The scrotum should be washed with the solution and the knife kept in it when not in actual use. There are two ways of making the incisions into the scrotum, but only the method advocated for commercial cattle will be described. It is as follows: Grasp the end of the scrotum with the left hand and pull it outward, so as to disengage the testicles. and then cut off a quarter or one-third of it by a single, clean stroke of the knife. This should expose the ends of both testicles. Now grasp each testicle in turn and gently but firmly pull it outward, so as to expose the attached cord for a few inches; then sever the cord by a scraping movement of the knife, removing an inch or more of it with the testicle, and the operation is complete. With older calves, where hemorrhage is more apt to occur, the use of an emasculator or an ecraseur for severing the cord may be justified. Ordinarily no after treatment is necessary, but the animal should be turned into a grass paddock or other nearby enclosure for observation during the first few hours. If the operation is performed during fly time, the application of pine tar around the wound will tend to keep the flies away.

Rickets in Pigs.

Rickets is a disease affecting the growing ends of the bones, and may be caused by a lack of lime or phosphorous in the ration, and also by a lack of a vitamine. Investigations have not yet shown whether the vitamine which prevents rickets is the fat soluble vitamine, or whether it is a fourth vitamine, the anti-rachitic vitamine. Young pigs fed on white corn and skim milk, without pasture, usually fail to thrive after a time, and many die from rickets or pneumonia. These troubles may be prevented either by feeding yellow corn or by including some well cured, green coloured lucerne hay in the ration. Henry and Morrison point out that the high value of lucerne hay for pigs not on pasture is due not only to its richness in protein and lime, but also to the fact that it is rich in the fat soluble vitamine. Hare and Steembock have shown that lucerne hay and cod liver oil will usually cure rickets in pigs if the trouble be not too far advanced. Whenever there is any evidence of this trouble 20 per cent. to 25 per cent. of choice lucerne hay should be included in the ration. In bad cases a teaspoonful of cod liver oil a head daily will usually be beneficial.

Mammitis

Prevention of mammitis is to be especially sought. In purchasing new cows dairymen should see that they come from herds where the teats and udders are sound. If a new cow, with unknown antecedents, comes from a public market, let her be milked for a week by a person who does not milk any other cows.

If unsuccessful in preventing the infection of cows in the herd, the next step is to treat the trouble on its first appearance. Directly the cows show any sign of congestion in the udder or any streakiness in the milk the udder should be massaged several times a day with warm soapsuds. The application of water, as warm as the

cow will stand, and the massaging are very effective. Some dairymen make a sheet to cover the udder, with holes cut for the teats. Soft rags are packed between the sheet and the udder and are kept warm by pouring hot water on to them for ten or fifteen minutes. When this has been kept up for an hour or two the bag may be well dried and rubbed with an ointment to close the pores of the skin. Many Queensland dairymen, amongst them many of the leading stud breeders, are loud in their praise of Bailey's Mammitis Cure. These breeders have had very little success with injections of boric acid solution into the teats, but there are some who say that they have never failed to cure a case of mammitis since they have had Bailey's Mammitis Cure on hand.

Rupture.

Case.—A draught stallion, six years, has a lump on the naval about the size of a hen's egg. When pressed it seems quite soft; it can be pressed with the palm of a hand so that it is almost level with the skin, and directly it is free it comes down again. (1) What is it; (2) what is the cause; (3) can it be removed?

Reply.—This is a rupture caused by the naval ring not closing up after birth. In most cases it can be cured by a surgical operation, but this should only be performed by a qualified veterinary surgeon. Unless the services of such can be obtained it will be advisable to leave well alone.

Bovine Tuberculosis.

Case.—A cow kept for household use has several lumps which appear to be abscesses, but it is thought that they might be tubers. The lumps are on each side of the cow's head, just below the ear, and they come and go periodically. The largest would be about the size of a pigeon's egg.

Reply.—In all probability this cow is suffering from tuberculosis, and as the milk from such an animal is dangerous as human food, particularly for children, it would be advisable to discontinue its use. As this disease is highly contagious and incurable it would be advisable to have the cow destroyed.

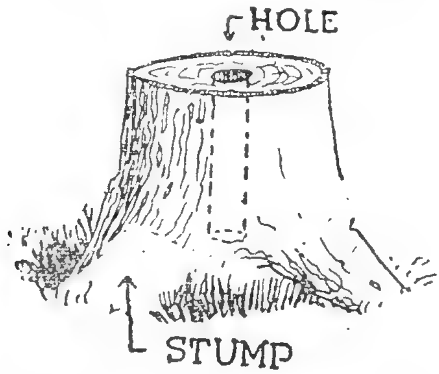
Udder Trouble Caused by Insect Bite.

Case.—A cow, a Jersey, calved fifteen months and still giving a fair quantity of milk. She commenced kicking at her udder. It was thought that she had been stung by an ant and little notice was taken. Next morning she was kicking continuously, was feverish, and the udder was a dark colour. The part was bathed and 1 lb. of salts administered. Each day she became worse. In four days her udder was almost black. Blood came through the skin of her teats during milking once a day. The milk, of course, was destroyed. The black skin then extended up the cow's tail. This lasted about a week, when the black skin commenced to lift. Another week went by and the cow became normal. Her milk throughout looked all right, and the beast was never really off her feed. The treatment given were several doses of Epsom salts, frequent bathing with hot water and Safonia, then a good greasing over the udder and teats. The cow, though it is fifteen months since she calved, is not yet in calf again. It is thought that the trouble was due to snakebite.

Reply.—From the symptoms described there is no doubt but that this cow was bitten by some insect. In such cases, as soon as such symptoms appear, the trouble will be relieved by applying household ammonia to the affected part. It might be necessary to repeat this treatment until the discolouration disappears.

BURNING STUMPS.

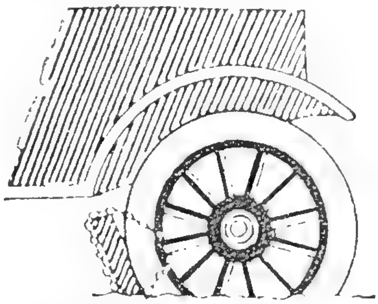
To remove stumps a good way is to bore a 2-in. hole 8 in. deep in the centre of the stump. This is best done in the spring. Fill this hole within 2 in. of the top with saltpetre. Cover the saltpetre with a light sprinkling of dirt, and fill the



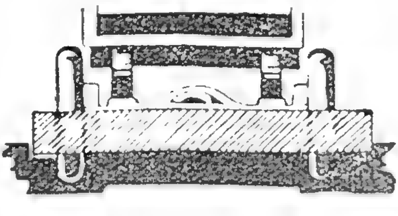
balance with water. Then forget the stump the next summer. Dig out the hole and fill with kerosene. Set fire to the oil, and the stump will burn out, even to the roots several feet under ground. I learned this trick from my father, and know that it will take out the stump, roots and all.

A BOGGED CAR.

The motor-car stuck deep into soft roads is a daily occurrence during rainy spells. A quick-moving method of removing the mired car from pits which are dug by the revolving wheels is shown in "Country Gentleman." A plank about six and



a-half feet long and two pieces of chain are all that is needed. Rope can replace the chains. Place this plank across the wheels, with a length of chain joining each end of the plank and the adjacent wheel. The wheels are locked to the plank, so



that these must revolve together, resulting in drawing the board under the wheels, and lifting them out of the deep recess. Even with the rear axle resting on the ground, this will lift the car out. The heaviest mud hooks cannot compare in effectiveness with this device.

Farm and Garden Notes for August.

Land which has been lying fallow in readiness for early spring sowing should now be receiving its final cultivation prior to seeding operations. Potato-planting will be in full swing this month, and in connection with this crop the prevention of fungoid diseases calls for special attention. Seed potatoes, if possible, should be selected from localities which are free from disease; they should be well sprouted, and, if possible, should not exceed 2 oz. in weight. Seed potatoes of this size are more economical to use than those large enough to necessitate cutting. If, however, none but large-sized seed are procurable, the tubers should be cut so that at least two well-developed eyes are left. The cut surfaces require to be well dusted with slacked lime, or wood ashes, as soon as possible after cutting. Where it is necessary to take action to prevent possible infection by fungoid disease, the dipping of potatoes in a solution of 1 pint of 40 per cent. formalin to 15 gallons of water, and immersing for one hour, will be found effective. Bags intended for the subsequent conveyance of tubers to the paddock should also be treated and thoroughly dried. After dipping, spread out the potatoes and thoroughly dry them before re-bagging. Where the tubers are cut, the dipping is, of course, carried out prior to cutting.

Arrowroot, yams, ginger, and sugar-cane may be planted this month in localities where all danger from frosts is over.

Maize may be sown as a catch crop, providing, of course, that sufficient soil moisture is available.

Sweet-potato cuttings may also be planted out towards the end of the month.

Weeds will now begin to assert themselves with the advent of warmer weather; consequently cultivators and harrows should be kept going to keep down weed growths in growing crops and on land lying fallow, as well as on that in course of preparation for such crops as sorghums, millets, or panicums, maize, and summer-growing crops generally.

Tobacco seed may be sown on previously burnt and well prepared seed-beds.

Kitchen Garden.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnips, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

Flower Garden.—All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragons), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm, moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2.63 in., and for September 2.07 in., increasing gradually to a rainfall of 7.69 in., in February.

Orchard Notes for August.

THE COASTAL DISTRICTS.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of citrus fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the Spring growth. All heavy pruning should be completed previous to the rise in the sap; and where Winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with lime and sulphur wash.

Where citrus trees are showing signs of failing, such as large quantities of dead or badly diseased wood in the head of the tree, they can (provided the root system is healthy) be renovated by cutting back the entire top of the tree till nothing but sound healthy wood is left. This should be thinned out, only sufficient main limbs being left from which to form a well-balanced tree, and the trunk and limbs so left should receive a dressing of lime sulphur, or Bordeaux paste.

Healthy trees that are only producing inferior fruit should be treated in a similar manner, and be either grafted with an approved variety direct or be allowed to throw out new growth, which can be budded in due course. The latter method is to be preferred, and an inferior and unprofitable tree can thus be converted in the course of a couple of years into a profitable tree, producing good fruit.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the tree's use during Spring. This is a very important matter, as Spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop, to a greater or lesser extent.

Do not be afraid if you cut a number of surface roots when ploughing the orchard, but see that you do cut them, not tear them. Use a disc plough and keep the discs sharp, and the root-pruning the trees will thus receive will do more good than harm, as it will tend to get rid of purely surface roots.

Planting of all kinds of fruit trees can be continued, though the earlier in the month it is completed the better, as it is somewhat late in the season for this work. The preparation of land intended to be planted with pineapples or bananas should be attended to, and I can only reiterate the advice given on many occasions—viz., to spare no expense in preparing the land properly for these crops—as the returns that will be obtained when they come into bearing will handsomely repay the extra initial expense. Growers of pineapples and bananas who send their fruit to the Southern markets should take more care in the grading and packing of such fruit, as their neglect to place it on the market properly means a big difference in price, and entails a loss that could be avoided had the necessary care and attention been given. The same remarks apply to the marketing of citrus fruits, papaws, custard apples, strawberries, cucumbers, and tomatoes, all of which are in season during the month.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the

surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You want only one strong shoot from your cutting, and from this one shoot you can make any shaped vine required. The spraying of vines for downy mildew is not compulsory, but an application eliminates black spot.

Fruit-fly will make its appearance during the month, and citrus and other fruits are likely to be attacked. Every grower should, therefore, do his best to destroy as many flies as possible, both mature insects and larvæ, the former by trapping or otherwise, and the latter by gathering and destroying all infested fruit. If this work is carried out properly, a large number of flies that would otherwise breed out will be destroyed, and the rapid increase of the pest be materially lessened. The destruction of fruit-flies early in the season is the surest way of checking this serious pest.

Keep a careful lookout for orange-sucking bugs, and destroy every mature or immature insect or egg that is seen. If this work is done thoroughly by all citrus growers there will be far fewer bugs to deal with later on, and the damage caused by this pest will be materially reduced. Destroy all elephant beetles seen on young citrus trees, and see that the stems and main forks of the trees are planted with a strong solution of lime sulphur.

GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The pruning of all deciduous trees should be finished during the month, and all such trees should be given their annual winter spraying with lime sulphur. The planting of new orchards should, if possible, be completed, as it is not advisable to delay. Later planting can be done in the Granite Belt, but even there earlier planting is to be preferred.

Peach trees, the tops of which have outlived their usefulness and of which the roots are still sound, should be cut hard back so as to produce a new top which will yield a good crop of good fruit the following season in from fifteen to eighteen months, according to the variety.

Apple, pear, or plum trees that it is desirable to work over with more suitable varieties should also be cut hard back and grafted. All almond, peach, nectarine, and Japanese plum trees should be carefully examined for black peach aphis, as, if the insects which have survived the winter are systematically destroyed, the damage that usually takes place from the ravages of this pest later on will be materially lessened.

Woolly aphis should also be systematically fought wherever present. The best all-round remedy for these two pests is spraying with black leaf 40.

In the Granite Belt the pruning of vines should, however, be delayed to as late in the season as possible, so as to keep the growth back and thus endeavour to escape late Spring pests.

Where orchards and vineyards have been pruned and sprayed, the land should be ploughed and brought into a state of as nearly perfect tilth as possible, so as to retain the moisture necessary for the proper development of the trees or vines and the setting of their fruit.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. K. CHAPMAN.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

1925.	JULY.		AUGUST.		MOONRISE. JULY.	MOONRISE. AUG.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	6·43	5·7	6·34	5·22	p.m. 1·2	p.m. 1·57
2	6·43	5 7	6 34	5·22	1·42	2·56
3	6 43	5 8	6 33	5·23	2·28	3·59
4	6·43	5·8	6·32	5·23	3·19	5·5
5	6 43	5·9	6·31	5·24	4·15	6 14
6	6·43	5·9	6·31	5·25	5·18	7·22
7	6·43	5·9	6·30	5 25	6·25	8 26
8	6·43	5·10	6·29	5·26	7·32	9·27
9	6·43	5·10	6·29	5·26	8 38	10·26
10	6·44	5·10	6·28	5 27	9·42	11·23
11	6 44	5·11	6·27	5·27	10·42	nil
12	6·43	5·11	6·26	5·28	11·41	a.m. 12·19
13	6·42	5·12	6·25	5·28	nil	1·14
14	6 42	5 12	6·24	5·29	a.m. 12·35	2 6
15	6·42	5·13	6·23	5·29	1·32	2·59
16	6 41	5·14	6·22	5 30	2 26	3 48
17	6·41	5·14	6·21	5·30	3·20	4·35
18	6·41	5·15	6·20	5·31	4·12	5·19
19	6·40	5·15	6·19	5·31	5·3	6·1
20	6·40	5·16	6·18	5·32	5 52	6 39
21	6·40	5·16	6·18	5·32	6 38	7·16
22	6·39	5·17	6·17	5·32	7·21	7·50
23	6·39	5·17	6·16	5·33	8·2	8·26
24	6·39	5·18	6·15	5·33	8·43	9 1
25	6·38	5·18	6·14	5·33	9·15	9·37
26	6·38	5·19	6·13	5·34	9·48	10·16
27	6·37	5·19	6·12	5·34	10·23	10·59
28	6·37	5·20	6 11	5·35	11·0	11·47
29	6·36	5·20	6 10	5·35	11·37	p.m. 12.38
30	6·36	5·21	6·9	5·36	p.m. 12·19	1·40
31	6·35	5·21	6·8	5·36	1·5	2·43

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

6 July	○ Full Moon	2 54 p.m.
13 ,,	☽ Last Quarter	7 34 a.m.
21 ,,	● New Moon	7 40 a.m.
29 ,,	☾ First Quarter	6 23 a.m.

Perigee, 6th July at 12 16 p.m.
Apogee, 20th ,, at 12 30 p.m.

On 3rd July at midday the earth will be in the part of its orbit which is at the greatest distance from the sun, 94,360,000 miles. On 6th July at 10.25 p.m. Jupiter will be in conjunction with the moon, that is apparently so close to it as to appear less than four diameters of the moon south of it. Both will be high up in the sky nearly due north. On 10th July at 8 p.m. Jupiter will be directly opposite to the sun, rising soon after the sun sets. On 11th July about half-an-hour or a little more after sunset, if the western sky is clear, the three planets, Mercury, Venus, and Mars, will be seen apparently very close to one another rather low down in the west, while not far above them the the bright star Regulus of Leo will add to the beauty of the scene. An annular eclipse of the sun will take place on 21st July, but visible only as a partial eclipse throughout the greater part of Queensland. Venus will be occulted by the moon on the 23rd about midday in Northern Queensland, but appearing to be a little above the moon though very near to it in the more southern parts of Queensland. An interesting daylight spectacle will be somewhat marred on this occasion by its nearness to the sun. Mercury will be in conjunction with the moon at 4.30 p.m. on the 23rd and should be noticeable in the western sky at sunset. On the 28th Mercury will be at its greatest height above the horizon at sunset.

4 Aug.	○ Full Moon	8 59 p.m.
11 ,,	☽ Last Quarter	7 11 p.m.
19 ,,	● New Moon	11 15 p.m.
27 ,,	☾ First Quarter	2 46 p.m.

Perigee, 4th August at 8 0 a.m.
Apogee, 17th ,, at 4 0 a.m.

A partial Eclipse of the Moon will take place on the 4th between the hours of 8.27 p.m. and 11.17 p.m., when the Moon will apparently change from full to a crescent shape at 9.53 p.m., and again become full.

THE PLANETS.

Jupiter will be in conjuction with the Moon on the 3rd. at 3.55 a.m. Venus will be in conjunction with the Moon on the 22nd at 3.46 p.m., when the planet will be about seven times the diameter of the Moon above it. Saturn will be in conjunction with the Moon at 5.46 p.m. on 25th, and will be well seen in the west soon after sunset.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

A Cross in this space is a reminder that your Subscription to the Journal expires with this number.

ANNUAL RATES OF SUBSCRIPTION.
Farmers, Graziers, Horticulturists, and Schools of Art FREE on prepayment of 1/- to cover postage. Members of Agricultural Societies, 5/-, including postage. General Public, 10/- including postage.

QUEENSLAND AGRICULTURAL JOURNAL

Vol. XXIV. 1 AUGUST, 1925. Part 2.

Event and Comment.

The Current Issue.

Readers will be pleased with the August issue, which covers a wider range than usual. Mr. Brünnich contributes a valuable paper on lime, and the importance of agricultural chemistry to the State is discussed in another special paper by Mr. Gurney. Mr. Cyril White has a valuable contribution on Queensland forests and forest trees. A paper on cream transport will engage the attention of dairymen, while poultrymen have much to interest them in Mr. Rumball's Notes on the Poultry Tick and other phases of their industry. Mr. Ballard has some valuable entomological information for cotton-growers. Recent valuations of certain samples of cotton are also noted. Bean Anthracnose, gumming of fruit trees, and an affection of banana fruit are discussed by Mr. Tryon. Mr. Edmund Jarvis's entomological notes for canegrowers continue as a valuable serial feature. The quality of Queensland ratoon cotton is the subject of an interesting review. What we owe to Farrer, the famous Australian wheat breeder, is made quite plain in a graphic survey of his work. Mr. Pollock's notes on the cultivation of the peanut, for which there has been a big demand, are reprinted in this issue. Owing to unusual pressure on space some other special articles, including an interesting one on goats and their breeding, have been held over for publication in the September number. Pig raisers are, as usual, well supplied with information of interest and value by Mr. Shelton. The August Journal is sure to be welcomed by every reader.

Our Magnetic North.

North Queensland is gradually coming into its own, and is already being described as the California of Australia. The glory of its winter climate is becoming more widely known, and Southerners in greatly increasing number are discovering in our magic North one of Australia's finest assets. The completion of the Great Coastal

Railway is already proving a tremendous factor in the development of tropical Queensland. In the course of the month representatives of the provincial Press of Australia, who had assembled in conference in Brisbane, were given an opportunity to see for themselves every phase of Queensland life and industry north of Capricorn, and among valuable and favourable results of their tour are the upsetting of many preconceived notions of Northern life and industry and the realisation that the agricultural, mineral, and general development of tropical Queensland is not only vital nationally, but is supremely sound as a business proposition.

The Governor's Speech—Sessional Programme.

The Third Session of the Twenty-third Queensland Parliament was opened by His Excellency the Governor, Sir Matthew Nathan, on 28th July. In the course of his Opening Speech the Governor said that, though a large proportion of Queensland is and must remain pastoral, the area at present utilised for the various branches of farming and agriculture could be vastly increased. The urgent need for considerable population in North Queensland, on the shores of the Gulf country, as well as east of the Dividing Range, would, he was convinced, eventually be thus met. While he realised that the marketing of produce from these areas as well as from any other new settlements that were being or might be created was the main difficulty in connection with their occupation, he believed that the overcoming of this difficulty would be greatly assisted by ample agricultural research and study. In those circumstances he was glad to be informed that his advisers were prepared to give consideration to the establishment of that Agricultural Faculty at the University, proposals for which had been recently put before them by the Senate. Another matter requiring research, said His Excellency, was the manner in which a large proportion of the people in the country were housed. The dwellings were often not the best that could be devised either for health, for comfort, or attractiveness. Generally, there was much in the Speech to interest the farmer, and in the course of remarks on the sugar industry the Governor referred to its stability as the result of judicious encouragement by both Commonwealth and State Governments. The surplus production last year, he said, combined with the surplus which was certain to occur this year, constituted a serious problem, but it was confidently expected that the arrangements which had been made for sales overseas and for the reduced prices for and rebates on account of sugar used in jams, canned fruits, and in other manufacturing processes, would result in the disposal to the best advantage of the sugar in excess of Australian requirements. Referring to rural organisation, His Excellency said that advantage was being taken by primary producers throughout Queensland of the comprehensive agricultural legislation recently enacted. Interest in the Queensland plan of rural organisation had also developed in the other Australian States. Among the proposals to be brought before Parliament in the course of the Session, and which are of especial interest to the farmer, are a Bill to amend the Primary Producers Organisation Acts; a Fruit Marketing Act Amendment Bill; a Bill to amend the Primary Products Pools Acts; a Graziers' and Settlers' Protection Bill; a Bill to consolidate and amend the laws relating to the Pastoral Industry; a Bill to amend the Main Roads Acts; an Irrigation and Water Supply Bill; a Forestry Bill; and a Land Act Amendment Bill.

The Prickly-pear Commission.

The First Annual Report of the Prickly-pear Commission has been presented to Parliament and is a most interesting and valuable document. Everyone regards the establishment of a new department, as the Commission points out, as a difficult task, because of the special effort of thought and organisation that is involved. The greatest difficulty in a new formation which public necessity has created lies, however, not so much in framing working systems as in handling the volume of work that must necessarily be encountered in the early months of its existence. The report amounts almost to an epic of energy and enterprise, and its story of practical achievement against tremendous odds has an especial interest and much valuable information for all who are in the centre of attack or along the line of advance of the cactus curse.

Bureau of Sugar Experiment Stations.

The Director of the Bureau of Sugar Experiment Stations has received the following report (6th July, 1925) from Mr. J. C. Murray, Southern Field Assistant:—

Gin Gin.

Growers here are feeling the dry weather. Apparently nothing like the earlier estimates of cane will be cut, and there is no promise of an open winter such as occurred last year to enliven the cane.

It was noticeable that the infection commonly known as mosaic occurred on almost all farms, as well as the fungoid disease ordinary called "Foot Rot" or "Root Rot." The control measures for the former are eradication and selection, whereas to control fungus parasites the growers should realise the importance of crop rotation.

Fungus diseases are spread by seed-like bodies called spores. Each disease has a different kind of spore, which can cause the disease. The longer a certain kind of crop is grown upon the same piece of land the more the soil becomes infected with parts of diseased plants and with spores. A change of crop therefore deprives these fungous parasites of a host and they disappear. For the canegrower the methodical planting of leguminous crops such as cowpea and Mauritius bean will not only have the desired effect in this respect, but will also supply humus and nitrogen to the soil if used as a green manure.

Growers are inclined to be easy-going in regard to these matters. It must be said, however, that many farmers are anxious to carry out soil improvement, but are continually faced with the necessity of taking a maximum crop off each year.

Canes making the best showing in the Gin Gin district at present are M.1900 and Q.813. Farmers continuing to plant D.1135 are recommended to obtain their plants from a different type of soil from which they are planting. A locality where excellent cane of this variety may be seen is Maidavale, about seven miles north of Bundaberg. Plants from this area would be a change for alluvial, black Maroondan soils, or red volcanic soils.

Bundaberg.

At Sharon the cane is showing a very fair crop, but dry. The farms back from the river are fairly healthy, although Leaf Stripe, Mosaic, and "Foot Rot" (*Marasmius sacchari*) are in evidence. This does not mean, however, they are badly affecting the cane. Remarks made about disease do not necessarily mean serious affections, but are for the purpose of letting the growers know they are present so that a careful lookout may be kept when planting. On the river the crops are heavier, although growers have more work ahead of them in regard to the eradication of Mosaic than those back on the forest loams.

The question is often asked, "Is there no cure for Mosaic disease?" There is no actual cure for an affected stool and it is improbable that it is worth while searching for one, seeing that the disease can be readily controlled by growers co-operating in the work of plant selection and the destruction of diseased stools. There would be no need for doctors if humanity could work on the same principle either. Care should be taken not to plant corn near to cane.

Canes that are making a good showing in this area are Badila, N.G.16, H.Q.285 (on the river), and M.1900, D.1135, and Q813 on the higher lands. Growers are strongly recommended to do away with all useless varieties and keep apart from their main crop any new ones they may be trying.

A noteworthy feature of this locality is the fine oranges and mandarins that can be grown. The writer has seen nothing finer in the world than those Sharon oranges. At Branyan the cane looks healthy on the whole, though dry. There is a great deal of land here that would grow good sugar-cane, and which, in the course of time, will no doubt be producing. Cane varieties making good growth here are E.K.28, H.Q.285, Q.813, M.1900 Seedling, D.1135, Q.970, N.G.16, Badila, Q.1098, and M.55.

Very little fertilising is being undertaken in this area. Judging by the texture of the soil and the reaction, lime would be beneficial, as well as green manures. In canegrowing areas at present the average attitude of the grower is, to use a colloquialism, "not to bite off more than he can chew." That is to say that small well-farmed areas are going to pay the best.

At Gooburrum conditions are much the same as at other places mentioned. In places the cane is backward, although along the North Coast road where new forest land has been planted there is cane probably equal to anything in Southern Queensland. Varieties that do very well on this class of land are D.1135 and H.Q.285,

that is why it is recommended earlier in this report to obtain changes of plants from localities such as these.

Crops generally will not be nearly so heavy as was anticipated two months ago. Rain has fallen within the last few days but the weather is cold. The temperature at present is about the minimum at which cane will grow, and by the outlook it is improbable it will begin to rise towards the optima until about August.

ON NORTHERN CANE FIELDS.

On his return to Brisbane, after a visit to the Northern sugar districts, the Director of Sugar Experiment Stations (Mr. H. T. Easterby) stated that his itinerary had embraced Bundaberg, Mackay, Lower Burdekin, Tully, Johnstone River, Babinda, Mulgrave, Cairns, and Mossman, and had occupied some seven weeks.

Bundaberg.

Early in June the Bundaberg area was found to be suffering to some extent from a dry spell. This also applied to the Isis district. The ratoon cane was not looking too well, but the plant cane was much better. The estimates of cane to be crushed for the various Bundaberg and Isis mills had been a good deal reduced. Later in June heavy rain fell, accompanied by gales, which laid some of the cane over. This rain was followed by cold weather which has prevented the cane generally from making much further growth. Extensive improvements have been carried out to the Bundaberg mills during recent years. At Fairymead new electric machinery was being installed, together with new triple effets, largely increasing the heating surface capacity of the mill. A greatly improved water supply had also been added, together with new boilers.

Mackay.

The Mackay district was also somewhat dry at period of visiting, as there had been no rain for some time. The mills in that locality had also reduced their estimates to some extent, though in one instance, North Eton, the expected yield was higher than anticipated in February last. The Mackay mills have nearly all increased their efficiency and capacity in recent years, and are now all capable of dealing with large crops of cane. New lands have been opened up along the North Coast railway line. In spite of reduced estimates, however, it is anticipated that Mackay will produce a record yield of sugar providing everything goes smoothly.

Lower Burdekin.

The Lower Burdekin district was visited in July, and the crops produced this year were in many instances remarkably fine. Some enormous crops of Badila cane were seen, in some instances running up to 60 tons and 70 tons per acre. Good crops of H.Q.426, B.208, N.G.24B, Q.813, Q.903, and E.K.28 were also inspected, some of the latter three varieties on Mr. G. Mackersie's farm at Ayr being exceptionally tall. The variety known as E.K.28 appears to be progressing in favour and is generally well spoken of. The young plant cane looks very promising, but the area planted did not appear as large as at this time last year.

Large stocks of sugar were being stored at Inkerman, Pioneer, and Kalamia, owing to the difficulty in getting the product away. A new Babcock boiler has been installed at Inkerman, with chain feed mechanical stoker for burning coal. This will be watched with considerable interest in view of the possible utilising of megasse in manufacturing celotex. Crushing at Inkerman was proceeding smoothly, a big crop being anticipated, and the mill was putting through 6,300 tons per week. Early in July the c.c.s. was 13.86 per cent. and rising. At Kalamia four additional crushing mills were being installed, which, when complete, will provide eight crushing mills in all—the largest plant of the nature in Queensland. New effets, vacuum pans, superheater, subsider, and two new boilers (Babcock and Wilcox) are being put in, a new chimney is being erected, while a new loco. and 150 additional trucks have been supplied. All these improvements will render the Kalamia mill practically a new one of high efficiency. At Jarvisfield some exceptionally fine crops were inspected, and it may be said that this year's production of Badila on the Lower Burdekin surpasses any cane of the same variety seen elsewhere, even at Innisfail.

Innisfail.

At Innisfail, after a continued spell of dry weather following the ordinary wet season, heavy rains in June were again experienced. Enormous crops of cane were visible in every direction and, for the greater part, of good growth and colour, though the ratoons were not so good as usual and most of the late-cut cane had not attained much growth. The crop, however, will be a heavy one, especially at South Johnstone. Grubs are doing a certain amount of damage, but it was estimated that not more than from 3 per cent. to 5 per cent. of the total crop had been affected. The cane at South Johnstone was being received at the mill in a much cleaner

condition than in previous years. At Mourilyan a new Mirilees-Watson 5 ft. 6 in. mill had been put in for this season's crushing, and this with some other addition, such as new chimney, Torricellian system for effets, together with the improvements carried out during the past two years has made practically a new up-to-date mill of Mourilyan sugar factory. The Goondi sugar mill was crushing smoothly, and dealing with large tonnages per week. A brief visit was paid to the Tully, where the new sugar mill was inspected, which is being erected by Walkers Ltd. for the Queensland Government. This exceptionaly fine plant is now well under way, the crushing mills, evaporating apparatus, electric machinery and boiler house, are completed or nearly so. The crushing and evaporating plants have been manufactured at Walker's, Maryborough, and the Bundaberg Foundry, and reflect the greatest credit on those foundries. The boilers, six in number, were made by Thompson, of Wolverhampton, and are of a different type to those usually found in sugar mills. The erection is in the charge of Mr. Barbat, of Ipswich, who also re-erected the Invicta mill at the Haughton River.

Babinda.

At Babinda, at the end of June, the strike in connection with foreign labour being too largely employed was entering upon its fifth week, and it was thought that a deadlock had been reached, the situation being complex. Happily the strike terminated shortly afterwards, on the 3rd July, the management agreeing to supply forty more British canecutters, and an additional thirty on tramlines, the men agreeing to work overtime in order to deal with more cane per week. The management also promised to employ 75 per cent. British labour in the fields next year if available. The cane on the Russell River, except the late cut, looked very well, but some grub damage was noticed here and there. In one area 31 acres had been eaten out. The northern end of Babinda was poor, the later-cut cane being backward. Grub damage was much in evidence and the original estimate of the Babinda mill is not likely to be reached. Mulgrave mill was doing good work, putting through about 6,400 tons of cane a week, the c.c.s. early in July being 12.4 per cent. Grub damage, however, was rather extensive, it being estimated at 12 per cent.

Mossman.

Great improvements have been carried out at the Mossman sugar mill. A new pan of 15 tons sugar capacity, made by Messrs. A. and W. Smith, has been installed, while a new crushing mill, made by the same firm, has also been erected. New engines, intermediate carriers, pumps, gantry and crane have been put in, and a fine new water service, capable of supplying 200,000 gallons per hour, has been added to the existing supply. The mill management have expended £32,000 this year and an additional £6,000 on tramway extensions. They now possess a plant capable of treating 1,000 tons of cane per day, and are hoping to secure the Daintree country as a further cane supply. This district presented some good cane, and cultivation has greatly improved of recent years. Fertilisers are largely in demand, and last year over 1,000 tons of manure were purchased by the mill and delivered to the canegrowers.

In the way of varieties E.K.28 and H.Q.458 were found to be doing well at Mossman. A great deal of D.1135 is still grown. B.147 shows signs of deterioration.

Field Days.

Highly successful field days were held at the Experiment Stations of Bundaberg, Mackay, and South Johnstone during the month of June. The attendances were large, and the keenest interest in Experiment Station work was displayed by canegrowers and others. The work of raising seedlings at South Johnstone aroused considerable attention.

Summary.

Taking the districts as a whole, some very fine crops were seen, and the yield is sure to be a large one, resulting in a surplus. It was found that the Northern mills with one or two exceptions were still holding to their early estimates, but several of the Southern mills had dropped their earlier estimates materially.

Three factors may be said to contribute to the surplus sugar production:—(*a*) The number of canegrowers has increased by 50 per cent. since 1920; (*b*) the area of land under cane has increased more than 30 per cent. since the same date; and (*c*) the season has, on the whole, been favourable in most parts of the sugar areas, especially the North.

While the surplus at present estimated will not be quite so large as originally anticipated, other factors may enter to still further reduce same, such as the present maritime strike, if continued, frosts, or an early wet season in the North. A good deal of late-cut cane last year has not made much growth so far.

The maritime strike, if it goes on any time, may have the effect of closing some mills up as their storage capacity is very limited.

CANE PEST COMBAT AND CONTROL.

The following report (3rd July, 1925) has been submitted by the Entomologist at Meringa (Mr. E. Jarvis) to the Director of Sugar Experiment Stations:—

Dipterous Larva Attacking Roots of Cane.

Towards the end of February last complaints were received from Mackay regarding what appeared to be a new cane pest, said to be affecting the sets and retarding or preventing development of young shoots of ratoon and plant crops. A grower at Finch Hatton, when examining stools that after cutting had failed to ratoon, found great numbers of small brown maggot-like larvæ adhering to the roots; the head-end being inserted into the living tissue, while the remainder of the body projected from the roots at angles varying from 45 to 80 degrees.

Several of these curious larvæ were sent to our laboratory, and when placed in breeding-cages produced imagines a few weeks later. These proved to be flies belonging to the Stratiomyiidæ, a family that includes many species of more or less economic importance.

The insect in question proved to be *Metoponia rubriceps* Macq.; a small black fly from three-eighths to half an inch in length, with smoky-brown wings, conspicuous red head, and large black, rather prominent eyes. The male, which is less than half the length of the opposite sex, is also black with very large eyes meeting above and occupying the entire upper surface and sides of the head. Its wings are dusky brown and the legs reddish yellow.

Although two broods of this dipteron are said to occur each year, the larval period is believed by Dr. Vera Smith to occupy more than six months, and possibly considerably longer than twelve months.

The perfect insect makes it appearance in Sydney for a few weeks during the spring, and again in the autumn. The flies are said to particularly favour well-cultivated lawns, and may be seen commonly flying over or resting upon the grass in such situations. At Finch Hatton, near Mackay, they were observed towards the end of May last in great numbers, especially, we are informed, over newly planted ground.

The eggs of this insect are laid in irregular masses, of form illustrated on the accompanying plate, and have been described as being "opaque, white in colour, and elongated oval in outline, slightly broader at one end than the other." The fully grown larva is about half an inch long, very sluggish in habit, and of a dirty yellowish-brown colour; each body segment bearing a tranverse row of stout black hairs. (*See* magnified sketch, Fig. 1 on plate.)

With regard to the likelihood of this stratiomyid being included in the near future among our more serious cane pests, I would point out that at present it would be rash to assume that the injuries to cane roots reported from Mackay should necessarily be attributed to the larvæ of *Metoponia rubriceps*. It is possible for such small larvæ to pierce and suck moisture from plant tissue without causing it to die; unless, of course, as happens in the case of certain sap-sucking bugs, some irritating poison be introduced into the punctured portion.

It is interesting to note in this connection that Dr. Vera Smith, when studying the life-cycle and habits of this insect, noticed that even when the larvæ were very numerous the grass harbouring them showed no ill effect from their presence.

Control Measures.—Paradichlor. and carbon bisulphide have been found successful fumigants against soil-frequenting larvæ; the former insecticide being preferable for such work owing to the fumes arising from it being given off during a period of from six to eight weeks or longer. At present, however, paradichlor. is not procurable in Australia, whereas carbon bisulphide can be obtained here.

The latter fumigant could be applied with a Danks Injector in doses of about ¼ oz. placed one foot part on each side of cane rows, at a time when the "strike" has just appeared above ground. These injections should be made about six inches from the centre of stools and three to four inches deep. Growers should bear in mind that such treatment will be thrown away unless the soil at time of injecting be free from excess of moisture. (See Bulletin No. 17 of this Bureau.)

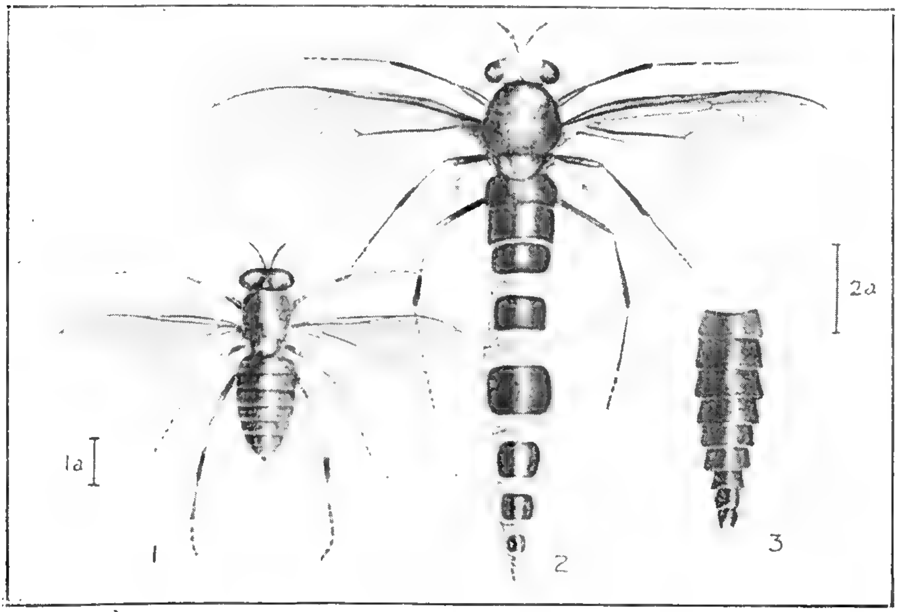
Dehydrated tar would, in my opinion, prove useful as a repellant against larvæ of this pest. It can be applied in the form of some tar-coated material such as coarse sawdust; from which the finer particles have been sifted; or with perfectly dry soil similarly treated. We have found the best proportion for coating the former carrier to be about 56 lb. of sawdust to 42 of tar. When thoroughly mixed, this can be handled and bagged without any risk of the tar subsequently leaking through or making a mess. If sown like manure, in a drill alongside the rows to a depth of about 4½ inches and then covered, and the soil consolidated above the drill, the deterrent odour should gradually penetrate to the sets, probably protecting same and the main roots from attack for several weeks; thus giving the plants a chance

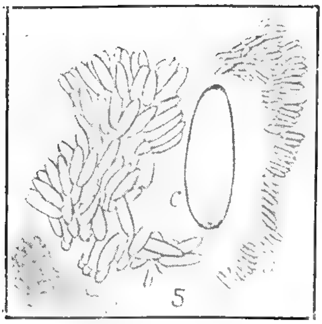
to get ahead and become strong enough to shake off the effect of any subsequent invasion.

Crude naphthalene, applied at the rate of 3 cwt per acre, has been found effective against wireworms, &c., and should also prove a means of controlling larvæ of *Metoponia rubriceps*.

Dehydrated Tar as a Repellant for Cane Grubs.

During the month of May the effect of dehydrated tar on grubs of *Lepidoderma albohirtum* Waterh. was studied in the laboratory. Twenty-four cages were used in this experiment, each containing about 36 cubic inches of soil, and a single third-





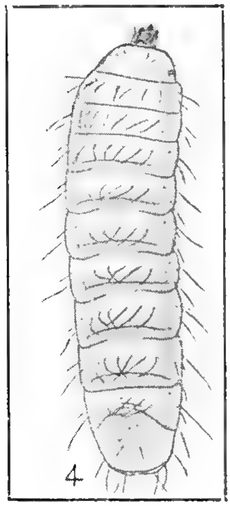


PLATE 26.

Fig. 1. *Metoponia rubriceps* Macq. (male) magnified.
Fig. 1a. The same, natural size.
Fig. 2. *Metoponia rubriceps* Macq. (female) magnified.
Fig. 2a. The same, natural size.
Fig. 3. Abdomen of female, showing the more usual appearance, magnified.
Fig. 4. Larva of *Metoponia rubriceps* Macq. (x 10).
Fig. 5. *a.* Egg cluster of *M. rubriceps* Macq. (x 5); *b.* egg cluster (x 10); *c.* single egg (x 32); *d.* sculpturing on chorion of egg (x 193).

(*Drawings after D. J. Farrell*).

grade grub. Doses varying from ⅛ to ¼ oz. of tar-coated sawdust were placed in these cages, the deterrent in some being mixed with the soil, while in others it was buried in a lump either at the bottom, centre, or close to the surface. When examined a couple of days later, all the grubs placed in bottom of cages with doses of ⅛ oz. in middle of same showed signs of being affected. By the twelfth day they were very sickly, one dying on the nineteenth day, while the remainder, although able to move their legs very feebly, were practically dead, some having assumed a deep brown colour. The repellant odour in the soil was still very strong after a lapse of twenty days, but had lost its sickly smell. In cages containing ¼-oz. doses the grubs turned a brownish yellow in less than a week, and by the end of seventeen days all were dead.

In tests where doses were placed at the top and bottom of cages results very similar to those given above were obtained; indicating that the odour had quickly penetrated through the soil from centres of injection.

As might have been expected, best results were recorded from cages where the deterrent had been uniformly mixed with the soil. Mr. A. N. Burns, Assistant Entomologist, who carried out this experiment, noticed that by the third day all grubs in these cages displayed symptoms of vomiting, indicated in each case by a globule of earthy matter adhering to the mouth parts; and that all these grubs assumed a deep yellowish brown colour before death. In cages containing ⅛-oz. doses all grubs were found to be sickly after a lapse of only one day, while a mortality of 100 per cent. was secured in less than a fortnight after treatment.

We may gather from the foregoing encouraging data that laboratory work with dehydrated tar has proved sufficiently conclusive to warrant the establishment of an experiment plot next season on some grub-infected area of cane land.

Liberation of Parasites of Beetle-Borer.

On 22nd May Mr. R. W. Mungomery, Assistant Entomologist, released 140 speciments of *Coromasia sphenophori* at South Johnstone. These were let go in four separate lots amongst cane near the river, on an area where this pest has occasioned considerable damage in the past.

On the 3rd June a farm at Babinda was visited where he liberated thirty-six tachinid flies in two separate lots at different parts of the same block; and again, a couple of days later (5th June), let go another batch of forty-two parasites at Meerawa. The worst infestation was found to occur, as usual, on blocks near the river bank.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

Cane Grub Activity.

During the recent spell of dry weather experienced from 16th April to 5th June much cane in the Innisfail, Cairns, and Babinda areas has shown evidence of grub attack; and although no further damage can now be effected, the grubs having ceased feeding, we may expect a big emergence of beetles during November or December next.

Growers would do well to locate the position near headlands of favourite food-plants of these insects, as native figs, such as *Ficus pilosa, nesophila, cunninghamii*, &c., and clear away any undergrowth chancing to surround them in order to stimulate the activity of such trees and render them easily accessible for collecting from during the flighting season. The propagation of young trees of *F. pilosa* is being carried out at present at our laboratory, and we hope to be able to distribute these to growers later on for planting at regular intervals on or close to headlands to attract beetles that may visit or migrate to cane land.

Watch for Evidence of Large Moth-Borer.

During the recent spell of dry weather experienced from 16th April to 5th June expected to appear in localities favoured by this moth-pest. At this time of year the tops of cane sticks nearing maturity are often tunnelled, such injury leading in most cases to death and ultimate browning of the unfolding central leaves. These so-called "dead-hearts" are sometimes mistaken for signs of fungus attack, but upon cutting through such affected cane tops one finds tunnels containing excreta, &c., which if opened up will be seen to harbour a smooth pinkish-yellow caterpillar about an inch long, that upon exposure to the light wriggles vigorously, and endeavours to fall to the ground. The basal and central portions of cane sticks are also frequently bored by this larva, such injury, however, usually remaining unnoticed unless severe enough to cause discolouration of the heart-leaves. When 10 per cent. or more of shoots are affected, all tops of canes showing "dead-hearts" should be cut off below the injury and either crushed or burnt to destroy the caterpillars or their pupæ. The latter are often found behind leaf-sheaths or at the ends of tunnels.

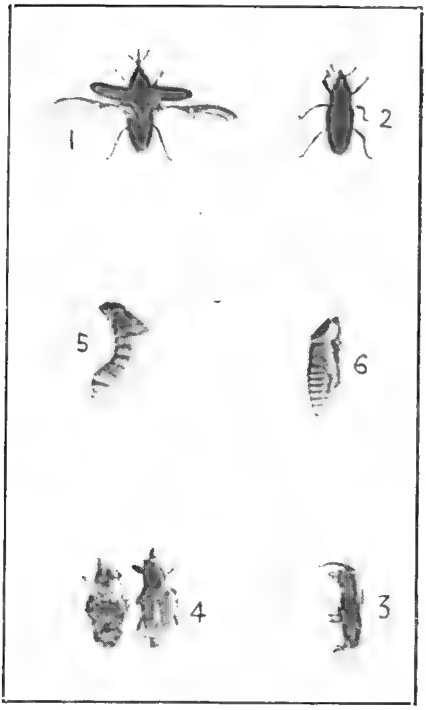


Plate 27.
Figs. 1, 2, 3—Weevil Borers (about natural size).
Fig. 4—The same, killed by Muscardine fungus.
Fig. 5.—Grub of same.
Fig. 6.—Pupa of same.

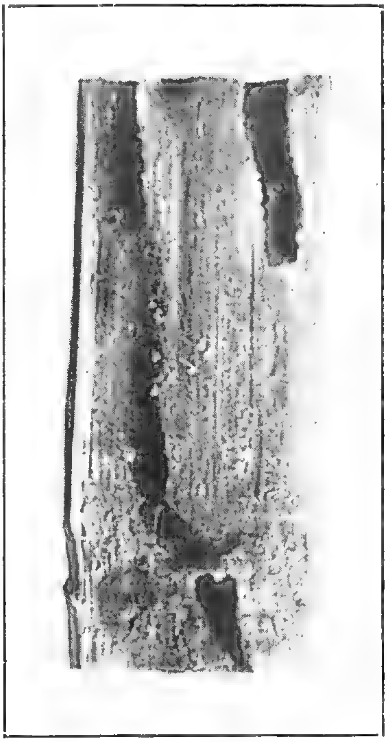


Plate 28.—Portion of Cane Stick with Tunnels made by Borer Grub.

Keep in Mind the Beetle-Borer.

Mention cannot be made too often of this notorious weevil, seeing that it is second only in importance to our greyback cockchafer. Growers should look out at intervals for indications of its presence in the basal portion of canes situated on low lands or river flats. When such be noticed, communicate at once with the Entomologist at Meringa. The Sugar Bureau will release the tachinid parasite of this destructive weevil (*Ceromasia sphenophori*) free of cost to growers who agree to leave from ¼ to ½ an acre of borer-infested cane for the flies to breed in. This must be left uncut for at least three months from date of liberation of the parasite, and must not be burnt.

Protect your Beneficial Insects.

Continue, as advised last month, to familiarise yourselves with the various parasitic and predaceous insects attacking cane-grubs, the larvæ and pupæ of which, when noticed during ploughing operations, should not be destroyed. Some of the commonest of these are figured and briefly described in Hints for March, 1925, given in the "Queensland Agricultural Journal," Vol. XXIII., pp. 273, 274; and "Australian Sugar Journal," Vol. XVI., p. 831.

ADVICE FOR AUGUST.

Farmers Should Read.

The object of these Entomological Hints—which have been issued regularly each month since November, 1923—has been, *firstly*, to familiarise growers with the more important insect enemies affecting sugar cane; and, *secondly*, to advise them, as the season progresses, of the actual appearance of such on the wing; of the insidious activity of certain grubs of root-eating beetles; or of the presence of larvæ of those species that tunnel in cane-sticks and young ratoons, or feed upon the leaves.

Since these hints deal only with cane-insects of *notable* economic interest, the damage occasioned by which continues in some of the species throughout a period of from two to four months or longer, a certain amount of recapitulation is unavoidable.

Although, perhaps, somewhat tedious to a few growers, such reiteration, however, doubtless serves to help others to memorise the various points of distinction peculiar to the beetles, grubs, caterpillars, &c., attacking their cane.

Fighting the Beetle Borer.

Growers are not likely to forget the efforts made by the Sugar Bureau to help them to combat this pest, by liberating in borer-infested canefields specimens of *Ceromasia sphenophori*, the well-known tachinid fly parasite, which has proved an important controlling factor of this weevil-borer in North Queensland, and also in Hawii, Fiji, and elsewhere.

These parasites are being bred continually at Meringa Laboratory, from which centre the Bureau is prepared to release specimens at any time, free of cost, to farmers who will agree to leave about half an acre of borer-infested cane for the flies to breed in. This should be left standing for at least three months, and must not be burnt.

On low-lying areas grossly infested by this borer good results can be secured from bait-traps. These consist merely of pieces of split cane (stick split once down the centre) about 18 in. long, placed in little heaps of from fifteen to twenty pieces or more on headlands of plantations and covered by trash to retard drying up. We have found it a good plan to lay such heaps in shallow cavities of about 12 by 20 by 8 in. deep cut in the firm soil and lightly covered with trash or other loose debris. In traps so constructed the split cane retains its moisture and gives off an attractive fermenting odour during a much longer period, and, moreover, maintains a conditions that induces these weevils to remain and congregate among the moist sticks.

Visit these traps every second day to collect the beetles attracted to same.

Other Cane Pests.

Owing to cool weather conditions little serious trouble need be anticipated this month from such insects as the "Large Moth-Borer" (*Phragmatiphila truncata* Walk.); the "Army Worm" (*Cirphis unipuncta* Haw.); the Cane Aphis (*Aphis sacchari*); or the so-called "Grass Worm" (*Laphygma exempta*). A look out, however, should be kept for the first indication of such migrating caterpillars, which usually originate on grassland in low-lying situations, from which they eventually travel in vast armies, taking all before them; and at such times are liable to invade canefields..

IN NORTHERN SUGAR LANDS.

SUCCESSFUL FIELD DAY AT SOUTH JOHNSTONE.

INSTRUCTIVE CANE TESTS.

The final of a series of successful field days, under the aegis of the Bureau of Sugar Experiment Stations, was held at South Johnstone. Very large attendances at each demonstration indicated the popularity of this form of practical field instruction in sugar cane breeding and culture in Queensland.

In its beautiful setting on the banks of the South Johnstone River, the Northern Sugar Experiment Station was the rendezvous for over two hundred farmers, representative of cane areas from Goondi to the Tully, on the occasion of the last field day of the annual series. There were present in addition strong contingents of professional, financial, and commercial men of Innisfail and other district business centres. All followed closely and appreciatively the demonstrations in cane planting experiments and the use of fertilisers and tractor power, and listened attentively to the interesting addresses of Mr. H. T. Easterby (Director of Sugar Experiment Stations), Edmund Jarvis (Entomologist), and J. F. F. Reid (Editor, "Queensland Agricultural Journal").

On arrival at the station the visitors were cordially welcomed by Mr. P. H. McWalters (chemist in charge).

In his address of welcome, Mr. Easterby made special reference to the excellent work accomplished by Mr. McWalters at the station, particularly in the work of raising seedling canes, in which excellent and highly valuable results have been obtained.

Value of Subsoiling.

In the course of the subsequent tour of inspection round the experimental plots, Mr. Easterby gave details of several experiments carried out at the station.

These he explained were laid down in 1920, to determine the value of subsoiling, and were carried on to a third ratoon crop last year. The largest yield from the third ratoon crop was that from the plot which had been subsoiled and fertilised, viz., 36.28 tons—a remarkably good tonnage from third ratoons.

The average yield of cane from the four crops was as follows:—

1. Not subsoiled, no fertiliser, 35.05 tons per acre.
2. Subsoiled, no fertiliser, 38.57 tons per acre.
3. Not subsoiled but fertilisers applied, 41.94 tons per acre.
4. Subsoiled and fertilised, 45.32 tons per acre.

Average difference in favour of subsoiling unfertilised plots (four crops), 3.52 tons per acre.

Average difference in favour of subsoiling fertilised plots (four crops), 3.38 tons per acre.

The results of this experiment had been uniform and confirmed the wisdom of subsoiling on suitable lands.

Fertiliser Results.

In experiments carried out with lime and basic superphosphate, and mixed with manure, it had been found, the Director explained, that so far the best results had been obtained from the use of basic superphosphate. From experiments as far as they had gone it had been found that phosphates give very good results on Northern lands, but further trials would be made along these lines.

Close Planting.

Experiments carried out at other stations, continued Mr. Easterby, had always shown the advisability of close planting. In order to find out whether this was the

case at South Johnstone, a series of experiments were undertaken. The results of the plant crop were as follows:—

1. Rows 5 ft. apart, plants spaced 12 in., 41.23 tons per acre.
2. Rows 6 ft. apart, plants spaced 12 in., 37.31 tons per acre.
3. Rows 7 ft. apart, plants spaced 12 in., 37.46 tons per acre.
1. Rows 5 ft. apart, plants spaced 6 in., 40.15 tons per acre.
2. Rows 5 ft. apart, plants spaced 12 in., 36.37 tons per acre.
3. Rows 5 ft. apart, plants spaced 24 in., 32.49 tons per acre.

As in previous trials of this nature, the closer planting had given the highest yields per acre. The variation in distance between the rows, however, had not had on this occasion a more important bearing upon the yield of cane when compared with the yield of the plots in which the distance between plants in the row was varied. These experiments, however, were very interesting, and should discourage those canegrowers who frequently advocate wide planting as a means of securing higher yields.

Seedling Propagation.

It was determined in 1921 to endeavour to raise new seedling canes at the South Johnstone Sugar Experiment Station. With the favourable environment there it was considered that success might be obtained. Accordingly, early in 1921, the chemist in charge was advised to commence work as soon as the arrows were sufficiently mature. Full instructions were sent, proper soil and boxes were prepared, and as soon as the arrows became "fluffy" they were sown separately.

A large number of seedlings had now been raised and field and chemical selection was taking place.

Following are the results, Mr. Easterby explained, of analyses of varieties:—

PLANT CANE, 1923. AGE, THIRTEEN MONTHS.

Tableland Badila	16.45
Tableland Goru	14.67
E.K. 28	14.63
Q. 903	12.5
N.G. 24A	16.02
Oba Badila	16.32
Q. 813	14.21
Q. 116 Sport	11.1
Badila Seedling	15.77
Rose Bamboo	15.26
H.Q. 426	15.19
M.Q. 1	15.68
N.G. 24B	13.8
N.G. 16	13.66

In the course of the tour through the well-kept field an opportunity was given canegrowers to compare the results of canes grown under various conditions. This arrangement was most valuable, for the results were even apparent to the uninitiated, and information respecting the method of cultivation and variety of cane of each plot was exhibited on cards at each headland. Both Messrs. Easterby and McWalters added interesting data.

Luncheon.

A generous luncheon was tastefully served on the verandah and beneath a bower adjoining. Provisions were in abundance, and it was a well satisfied group that faced subsequently the ubiquitous photographer. The catering was in the capable hands of Mrs. and Miss McWalters (mother and sister of the chemist in charge) and other ladies, whose excellent hospitality earned for them three rousing cheers from those assembled.

The Addresses.

After luncheon informal addresses were delivered by Mr. Edmund Jarvis, of the Entomological Station at Meringa, and Mr. J. F. F. Reid, Editor of the "Queensland Agricultural Journal." Mr. Easterby presided.

Mr. Jarvis on Cane Pests.

Not the least interesting item in the day's proceedings was the address on Cane Pests by Mr. Jarvis. He explained that, like most insects, the life of the grub occurs in four stages: the egg, the grub, the chrysalis, and the fly. The eggs are laid at a depth of from 1 to 2 ft., and, unfortunately, cannot be disturbed by cultivation. Under difficult conditions they can be attacked by carbon bisulphide.

The same fumigation is more successful in the grub stage. Paradichlor. may be also used. Hand collecting is recommended, as one beetle will produce twenty-four grubs. Then native enemies might be encouraged, such as the digger wasp, the ibis, and green fungus. In the winged or beetle stage they are particularly attracted to fig trees, and will feed readily on the poisoned leaves. Paris green can be used as a spray for the poisoning.

Continuing, he said that the next pest to be considered was the borer, which did considerable damage in every cane district. The liberation of certain flies was the best remedy against the borer. Then the pest could be extensively trapped on the headlands, and destroyed in the burning of the cane trash. It had been noted that some seed canes were unattractive to the borers. Mr. Jarvis's remarks were keenly appreciated.

Tribute to the Agricultural Press.

Mr. Reid, in the course of his remarks, said that, while Mr. Jarvis and other agricultural scientists were able to get at the facts of any particular scientific problem and suggest solutions, he was faced with the difficulty of getting the farmer's ear and impressing him with the economical importance of the scientist's investigations and discoveries. To aid him in this, departmental publications were brought into service. In this desirable publicity they had also to acknowledge the assistance to the industry of the Agricultural Press, which was an excellent medium for bringing before the farmer the results of agricultural research, and Queensland, he said, was very fortunate in that respect. In no capital in Australia was so much space allotted to rural matters by metropolitan dailies, while the general standard of the country Press, from a farmer's point of view, was a very high one. Results of experiments and notes on current agricultural problems and topics always found ready publication in full with wise and intelligent comment. This active and valuable form of agricultural extension merited their appreciation. In healthy and progressive agricultural development, experimental work was essential, but if its results were not conveyed to the farmer in readable and digestible form it was of little real service to the community. The importance to the farmer of publications like the "Queensland Agricultural Journal" and the general agricultural Press was therefore quite obvious.

Higher Agricultural Education.

In commending the educational policy on which Sugar and Stock Experiment Stations and the Queensland Agricultural College were based, Mr. Reid said that it was the function of higher agricultural education not only to train students who will ultimately enter into the practice of agriculture on their own holdings, but also instructors, research workers, and the moulders of their agricultural future. With this object in view the courses at Gatton should develop still further the scientific side, and the College, he thought, should definitely take its place as an auxiliary to the Queensland University.

Science, as applied to agriculture, was receiving every encouragement under a far-sighted rural policy which aimed to bring agriculture within range, if not of a distinct profession, at least of a sound and well regulated business. Agriculture, it was recognised, was evolving into a complex and scientific industry, showing at each step the marks of the direct influence of pure science. It was believed that pure science constituted the active source from which true, practical progress—sometimes, it was admitted, along winding paths—was being made. The testing of new theories and their advance to the stage of practical experiment, and then the general diffusion of the newly acquired knowledge, was, as was evident at the annual field days, engaging the attention of the scientific and field staffs of the Department of Agriculture.

As was also in some measure evident that day, the whole available forces of modern science and invention were being brought into focus by the Department in field work and efforts to solve their farming problems. (Applause.)

On the motion of Mr. Percy Pease, M.L.A., cordial votes of thanks were accorded Mr. Easterby and the other speakers. A similar compliment was paid to Mr. McWalters and the staff of the station.

Tractor Demonstration.

Part of the afternoon was devoted to a tractor demonstration, when two firms handling farm machinery gave excellent displays of their tractors, the working of both machines—a Cletrac and a Rumley—being followed with great interest.

The outing was a social and practical success, and served to show the leading part the scientist takes in assisting the grower to get the very best results. The South Johnstone Sugar Experiment Station is fulfilling its good purpose of guiding the canegrowers in the practical part of the business, and growers have good reason to appreciate the assistance accorded them in this direction.

THE CULTIVATION OF THE PEANUT.

By N. A. R. POLLOCK, Northern Instructor in Agriculture.*

Description.

The Peanut, "*Arachis Hypogeia,*" also known frequently as the earth or ground nut, is a plant of annual habit, belonging to the natural order Leguminoseæ or pod-bearers, and in common with most other members of the pea family has the power of obtaining its nitrogen supply from the atmosphere and storing it up in nodules on the roots.

Unlike other legumes, excepting the Bombarra ground nut, "*Voandzeia Subterranea,*" this plant, while blooming above ground, matures its pod or fruit under the surface of the soil. The yellow flowers are borne at the joints where the leaves are attached to the stem, in the bunch or upright varieties at the base of the plant, and in creeper or procumbent varieties right along the stems. Upon pollination taking place the flower fades, and falling off leaves the stalk with a thickened pointed end called the "peg" or "point," which grows down into the soil, where it matures into the pod or so-called nut. It is apparent from this that the soil on which the crop is grown should be of a soft or friable nature or such that a loose surface can be easily maintained.

Range.

The peanut can be grown over the whole of Queensland, and while in the cooler parts it only succeeds in summer, in the tropical portions it may be grown at any period of the year where a sufficiency of rain falls.

The period of growth ranges according to variety and climate from fifteen to twenty weeks, the longest period being taken up by the creeper or procumbent varieties.

A moderate rainfall, plenty of sunshine, and a comparatively high temperature best suit the crop, and departures from these may result in a more lengthened period of growth. The crop can also be grown under irrigation.

Soils.

The nature of the soil on which the crop is grown, besides its fertility, is the main factor in a profitable crop. A loose texture is desirable to allow the pegs to easily penetrate and expand to form the pods and mature evenly, as well as to permit of easy harvesting in freeing the nuts from the soil. Good drainage is also essential, more especially when a heavy rainfall is liable to occur during the growing period.

Light sandy loams are best adapted for the production of peanuts for market as edible nuts, since the shells are clean and bright. Soils inclined to be clayey are apt to stain the shells, and though the berries or peas may be of equal quality, the clean, bright shell, being more inviting, will naturally command a better price. Ill-drained or sour soils are not desirable. Peanuts may be grown on most soils except a heavy or puggy clay, but except in the loose, friable soils they should only be grown for feeding off.

Rotation.

Peanuts should always be grown in a rotation, as though owing to the roots being harvested the same quantity of nitrogen is not left in the soil as with other legumes, where the whole root system is available, a sufficient quantity of the nodule-bearing rootlets are left to exert an influence on the following crop. At Tolga, in a comparison with potatoes grown on land on which the previous crops were maize and peanuts, the yield on the portion previously cropped with peanuts was estimated by an official of the Department to be 9 tons of tubers as against 6 tons on that previously cropped with maize. In the rotation, however, the peanut, when harvested, should not take the place of the legume or other crop that is ploughed under to restore the organic matter in the soil, and should only be looked upon as adding a quantity of nitrogen. Where the whole growing plant is ploughed under it answers the same purpose as cowpeas, Mauritius, and velvet beans, &c.

In orchards, either as a crop to be ploughed under or to be harvested, the peanut is commended.

Fertilisers and Lime.

In common with other legumes, the peanut thrives best in a soil in which there is a sufficiency of lime. Not all soils require the addition of lime, but most soils in districts subject to heavy rainfall, and which give an acid reaction, will benefit by

* Reprinted from "Queensland Agricultural Journal" for June, 1922.

an application of from 5 to 10 cwt. of stone lime or 10 to 20 cwt. of earthy lime or pulverised limestone to the acre, broadcasted (not ploughed in), preferably a week or more before applying commercial fertiliser and sowing the seed. The cultivation of the crop will sufficiently work this lime into the soil. Where any doubt exists as to the necessity of applying lime to the soil, a portion should be limed and the resultant crop compared with a similar area unlimed.

In applying manures for the crop, care should be taken to only apply organic manure is a well rotted condition, and then only in small quantities and thoroughly mixed with the soil. Larger quantities or fresh manures will result in many of the pods being poorly filled. These poorly-filled pods are known as "pops" or "duds."

Organic manures should be applied to a previous crop to get the best results.

As the peanut is a legume and draws nitrogen from the air, this element is not called for in quantity in the fertiliser, but its presence in small quantity, say, 2 per cent. or 3 per cent., will be beneficial. Phosphoric acid and potash will be the chief elements in the fertiliser, and the quantities will be dependent on the soil content. In general, a fertiliser containing from 10 to 12 per cent. phosphoric acid, 2 to 3 per cent. nitrogen, and 6 to 8 per cent. potash will be a good mixture, and may be applied in quantities of from 1 cwt. to 5 cwt. per acre. Such a mixture can be obtained with 1 part sulphate ammonia, 7 parts superphosphate, and 1½ parts sulphate of potash.

The most suitable application will be discovered by applying varying quantities over a small area and noting results, but usually 2 cwt. is sufficient.

Commercial fertilisers are usually applied immediately prior to planting a crop, and as the roots of the peanut do not spread to any distance, the application in the drill with a fertiliser distributor having one or two tines at the back will greatly aid in mixing the fertiliser with the soil.

Ashes from the forest hardwoods, which contain lime and potash, are useful, and may be applied to the soil broadcast in a similar manner to lime at the rate of about 10 cwt. to the acre. These ashes, however, should not previously have been exposed to rain, as then a great deal of their value will have been lost. The ashes of soft woods growing in the scrubs are not considered so good.

Selection of Seed.

As with other crops, in order to secure the best results it is essential that the seed of the peanut should be of the highest grade. Poor seed cannot be expected to yield a good return. In the first planting, seed should be secured from a heavy producing crop and subsequently carefully selected in the field from the heaviest producing plant of the required type. A good plan is to select the nuts from the best producing plants and sow these in a special seed patch, each year selecting the best of this area for next year's seed patch. Nuts harvested for seed should be fully matured, handled carefully, and not picked from the plants for several weeks after curing; they should then be picked by hand and the selected ones thoroughly dried and stored in a dry place free from mice or insect attack. Storage in tanks in a similar manner to maize is most satisfactory.

Methods of Planting.

The seed can either be planted whole or shelled. Whole nuts may be soaked in cold water twelve to twenty-four hours, drained, dried for an hour or two to assist handling, and then planted. This accelerates germination. Shelled seed should not be soaked.

Where shelled seed is used the shelling should be done by hand, though hand shellers carefully handled are sometimes used. All shelled seed in which the thin skin covering the seed is broken should not be sown, as this injury is liable to affect germination.

Breaking the pods in two answers the same purpose as shelling. Where the seed after planting may be subject to attack by vermin, the seed may be treated by springling with a solution of equal parts of stockholm tar and kerosene. In this case, however, to protect the maturing crop it is advisable to destroy, by poisoning, the vermin beforehand.

Whether planted whole or shelled the operation may be effected by hand or with planters especially designed for the purpose.

Amount of Seed.

The amount of seed required to plant an acre is about 40 lb. of the whole nuts and from 25 to 30 lb. of whole nuts shelled, varying slightly according to the weight of the nut and the distance apart they are planted. Some growers use as much as 60 lb. per acre of the large podded varieties. It is interesting to note that the whole nut, when planted, provides but one plant, but if shelled and the kernels planted apart, two plants will result.

Time of Sowing.

According to the climates of the various districts, so will the time for planting vary.

In the cooler districts, sowings may be made when all danger of frosts is over and the soil can be expected to be reasonably warm, September, October, November, and December being suitable months. In the tropics the crop can be grown practically throughout the year, but consideration must be given to climate and rainfall—*i.e.*, sufficient rainfall should be obtained to grow the crop and fine weather be expected at harvest time.

In the tropical portions of the State, where the monsoonal rain or wet season commences in December, the main crop is sown in January, February, and March, according to the likelihood of reasonably fine weather in the months of April, May, and June or July, when harvesting should occur.

In planting large areas it is recommended to spread the sowings over such a time as will allow of harvesting one lot before the next is over-ripe. Peanuts left too long in the ground are easily detached from the plant and consequently more difficult to harvest, while some varieties are liable to sprout.

Length of Crop.

The large nuts or creeper varieties require a longer time for growth to maturity than do the bunch or upright varieties, the time varying from fifteen to seventeen weeks for the bunch varieties and from seventeen to twenty weeks frequently for the creeper variety.

Preparation of Land.

In preparing the land for peanuts the first ploughing may be deep, but the second should not be deeper than 6 in., preferably 5 in. This top 5 in. should be brought to a fine tilth and be free from weeds and trash.

Where lime or ashes have been applied the land is harrowed and drills drawn out, in which the fertiliser, if any, is mixed and the peanuts sown either by hand or with the planter. The drawing of drills may be done with the fertiliser distributor, or the whole operation can be done with a seed drill and fertiliser distributor combined.

Where no seed drill or fertiliser distributor is obtainable, the drills could be drawn out with a cultivator having a wide shovel attachment in the rear, the fertiliser dusted along this by hand, the cultivator then run along the drill with tines set close in front to mix the fertiliser with the soil, and the shovel attachment set at the back to reopen the drill for the reception of the seed to be dropped by hand; this drill should not be deeper than 4 in. from the levelled surface of the soil, and the seed should be covered to a depth of 2 to 3 in., according to the texture of the soil and its moisture content. In light soils where evaporation is great the deeper planting is preferable, but in stiffer soils the shallower covering should be adopted.

A light firming of the soil over the seed is desirable, and this is obtained in the seed drill by a wheel at the rear. When planted by hand the area may be covered with the harrow, or preferably by the cultivator, with tines straddling the drill and set so as to throw the soil inwards.

Time of Germination.

Germination usually occurs with shelled nuts in five days, but is subject to the amount of moisture and heat in the soil. The whole nuts take longer unless first soaked in water, as the moisture has to penetrate the shell to affect the berry or pea which contains the germ.

Spacing.

The intervals between drills and the spacings between seeds in the drills vary somewhat, according to the richness of the soil and the variety planted.

The bunch or upright varieties take up much less room than the creeper or procumbent kinds, and the growth of both is correspondingly greater on the richer soil.

In general, the drills are drawn out from 30 in. to 42 in. apart, the distance being influenced by the space required by the cultivating implement.

The spacing of the seed in the bunch varieties may be from 6 to 12 in. apart, and of the creeper varieties from 12 to 24 in. apart in the drill. An instance of success with close planting is noted from an experiment in which, in a light sandy loam, the bunch varieties were planted 3 in. apart in drills 30 in. wide. It is thought, however, in richer soils this crowding of the plants would be detrimental.

Cultivation.

Where close planting has been adopted the land may be harrowed with a light harrow shortly after the plants appear through the surface. Otherwise it will be better to use the cultivator between the rows and the hand hoe, where necessary, between the plants. The first one or two cultivations should be done with fine points, as in the strawberry cultivator or the $1\frac{1}{2}$-in. or narrowest shovel points supplied with the usual 5-tooth cultivator; after this the broader points can be used and later the hilling attachments. In early cultivations the cultivator can work close to the roots, but not deeper than 2 in.; but later, after flowering, when the pegs enter the soil care should be taken that the plant is not disturbed.

In most soils it is desirable to draw a little of the soil in towards the plant to provide a bed of fine earth in which later the pods may form, and this can be done at each cultivation, finally leaving a flat bed in which the plants are growing with a water furrow between each drill. The height to which hilling may be practised depends largely on the soil. Usually, the heavier the soil the more necessity for hilling.

Soil should not be thrown on the centre of the plant, the object of hilling being to provide fine soil for the pegs to enter and mature evenly and for ease in harvesting. As a rule, in the creeping varieties the pegs easily reach the soil, but in certain cases a light roller run over the crop will facilitate this operation. In the bunch or erect growing varieties no rolling should be attempted, but a final higher hilling made if it is noticed the points have some distance to go to reach the soil.

Harvesting.

The time for harvesting is noted in the appearance of the foliage, which starts to yellow or lose colour, and by examination of the nuts. If the majority of the berries or peas are full grown and the inside of the shell has begun to colour and show darkened veins, the crop is mature and harvesting should not be delayed.

If the crop is harvested too early the proportion of "duds" is very great, while if deferred too long some of the nuts may germinate and others become detached from the plant when lifting, while the tops, having lost most of the leaves, will be of much less value for fodder. In some soils, notably the friable chocolate volcanic loams, the plants may be lifted by hand, when most of the nodule-bearing rootlets are left behind and only the root stock with the nuts are lifted. In other cases it is necessary to loosen the soil before lifting out. In small areas this is sometimes done with the digging fork inserted under the plant, which is lifted while the fork is worked underneath. In large areas a potato digger with an endless belt elevator from the shovel point is found very effective where the soil is dry enough to fall through the slats of the elevator and the crop is free from weeds.

A very satisfactory digger could, however, be made on the farm or by a local blacksmith by attaching to an ordinary wooden plough beam a knife edge to go under the plant and cut the roots just below the nuts; finger bars at the rear of this knife edge would lift the plants and loosen the earth, thus facilitating the lifting by hand. The width of the knife edge should be sufficient between the attaching portions to the beam to allow of the whole plant passing through, and the depth should be regulated by the wheel or wheels in front. Perhaps a better idea might be given by taking the back off an ordinary earth scoop, together with all the bottom excepting 6 in. in front, and substituting finger bars slightly elevated to carry the plants and attaching the whole to a plough beam with handles. In a digger of this description, where one horse is used, the digging attachment would be to one side of the beam, while with two horses it would be in the centre, the operator straddling the row and the depth regulating wheels being preferably two, one on each side of the line of plants.

Where an ordinary plough is used the share should cut 10 or 12 in. wide and the mould board removed and some rods substituted to prevent the tops being mixed with the soil.

It should always be remembered that the cutting of the roots as close to the pods as possible results in the greater quantity of nitrogen being returned to the soil.

Harvesting should not begin until the dew is off and the tops are dry, and the operation should be regarded as a hay-making of the tops, and not more than can be handled should be lifted in any one day.

Curing.

After the plants are lifted and the soil shaken from the nuts they are allowed to lie either spread on the ground on in small bunches until the leaves are wilted, but not curled or brittle. They are then bound in small sheaves or taken separately and stacked until cured. The time in which the plants are allowed to wilt varies according to the weather, and in some cases stacking may be necessary within an hour of lifting.

The usual method of curing peanuts where the quantity is large is to place them in small stacks around a pole. From twenty to thirty poles will be required for an acre.

These poles should be reasonably stout, from 2 to 3 in. of hardwood in diameter at the bottom end, which should be sharpened. When erecting, holes are made in the soil with a crowbar, post-hole digger, or earth auger, and the pole inserted or driven down with a mall to a depth that will ensure their not being blown over with the weight of the stack upon them. Crosspieces about 3 ft. in length are now nailed across the post at right angles, one immediately above the other, 9 to 10 in. above the level of the ground; 3 by 1-in. hardwood battens answer the purpose admirably. According to the crop, six or seven rows are taken on each side of the poles, and the plants, when wilted, forked into one row on either side of the pole. When stacking, a few vines are placed across the crosspieces, which keep them off the ground, to form the foundation. The vines are then stacked by hand with the nuts next to the pole and tops outward, pressing down each layer and building evenly around the pole. From time to time a bunch should be divided and hung around the pole to bind the mass and to assist in keeping the centre high.

This latter is important in that it allows any rain falling to run off. When the stack is approaching 3 ft. high the vines should be drawn closer round the top and finished off with a cap of grass as a thatch to run rain off. It is important that free circulation of air should obtain through the stack in order to facilitate curing. The building of thick or high stacks or pressing them too tight will tend to cause heating, with consequent damage to both fodder and nuts.

After about two weeks in the stack the peanuts may be stored in the barn, but the nuts should not be picked from the vines until preferably six weeks from the date of harvesting, as if picked too soon they are liable to shrivel, and there is danger of fermenting or moulding after picking.

Picking.

The usual practice in this State has been to pick the nuts from the cured plants by hand—a tedious process, the cost of which, if the ruling rate of wages were paid, would be prohibitive, since 60 lb. is considered a fair day's work. This practice of hand picking has been followed for ages, and is still the usual method adopted in countries such as India, China, Japan, &c., where labour is plentiful and cheap. In certain cases, too, the nuts are washed by agitation in frequently changed water and dried in the sun to obtain a clean inviting article for edible purposes. This is necessarily a costly undertaking, and would need a much higher price for washed nuts to compensate.

Other methods adopted in North Queensland with a lessening of expense have been, in the case of the bunch nuts, to hold the stems in the hand and thresh the nuts off by beating across tightly-drawn wires or the edge of a board placed midway across a box or other receptacle to hold the huts, and with both bunch and creeper to rub the whole plant over a wire netting drawn tight until the nuts fall through. Subsequent winnowings remove trash and light pods, and it is stated thoroughly drying the resultant nuts in the sun will cause the stems or tails to break off in the bags, resulting in a clean sample when it reaches the market.

In other lands, however, labour and time saving machinery has been evolved which does very satisfactory work in picking, stemming, cleaning, grading, and bagging for market, without breaking or damaging any appreciable quantity of the pods.

Two types of pickers are on the market in the United States of America—one working on the principle of a cylinder grain-thresher and the other one in which the plants are drawn between spring points over a wire mesh in such a manner that the nuts are pulled off and fall through on to a conveyor, which carries them through a winnowing process to a stemming apparatus, after which they go through a further winnowing and a cleaning and grading process. Two machines of the latter type are in use in the Cooktown and Tableland districts respectively.

The cost of machines of this description is too great for the individual in most cases, and it would be advantageous, where any considerable area was under crop, for farmers to co-operate in the purchase, when the machine, which is on wheels, could be transported from farm to farm.

Contract picking is a feature in the United States just as contract chaffcutting is in Australia. The picking crew, working day after day, naturally become expert; so that a greater average quantity is handled daily with less damage than when novices or hands out of practice are engaged.

When a power-driven picker is in use it is advantageous to place it in a central position in the field where the poles with the stacked peanuts can be transported

bodily to the machine, resulting in less handling. With suitable uprights with a cross bar attached to the dray a lever with a grip attached to the top of the pole and passed over the cross bar would use it as a fulcrum, when the long end of the lever being lowered to the shaft would lift the pole entirely clear of the ground, allowing of its quick and easy transport to the picker.

The stems or vines of the plant, after the nuts are detached by the picker, can be stacked, baled, or chaffed and used for forage purposes, while the "dud" nuts (small or immature) can be fed to stock.

Marketing.

The nuts are usually bagged whole and shipped to the buyer, but where freights are high it is sometimes more remunerative to market the kernels only.

Special machinery is available to shell peanuts with a minimum of damage to the kernels. Bruising of the kernel at shelling or during transport is injurious, as decomposition is liable to set in and rancidity occur.

Shelled kernels should also be absolutely dry before packing for the same reason. Each variety should be kept distinct, whether shelled or unshelled, as oil millers are understood to give lower prices when the kernels are of different colours.

Diseases.

The peanut is seldom subject to disease when grown under proper conditions of soil and drainage. The most common disease noticed in Queensland is a form of leaf spot (*Cercospora* sp.) which appears as brownish spots on the leaves and is most frequent on sour or poorly drained land. When this appears late it will be possible with the upright growers to mow the tops and make hay before they are too far gone. Another disease that has been noticed on occasion is a kind of fungus attacking the stem where it enters the ground and is characterised by a cobwebby appearance, due to the mycelial threads of the fungus on the stem just below the surface, together with the appearance of minute round white or brown bodies the size of mustard seeds, which are the spore cases of the fungus. A proper system of drainage, together with liming and a rotation of crops, will minimise disease in the peanut as with other crops.

Pests.

Insect pests are of infrequent occurrence, so far the only attack noticed in the State being odd instances of mealy bugs on occasional roots.

Vermin are very partial to the nuts, as are many birds outside those domesticated.

The duty recently imposed by the Commonwealth on peanuts and peanut oil is as follows:—On peanuts from the United Kingdom, 2d. per lb.; other British countries, 3d.; foreign countries, 4d. On edible oils, which include peanut oil:—From United Kingdom, 2s. per gallon; other British countries, 2s. 6d.; foreign countries, 3s.

The protection afforded by this tariff should compensate for the additional costs in growing under white labour conditions in Australia, and peanuts should become a staple crop in North Queensland.

Yield.

The yield of the peanut crop will, of course, depend on the fertility of the soil, amount of rainfall, and attention bestowed.

While it will bear a satisfactory crop under a small rainfall, showing to an extent that it is drought resisting, it is not injured by excessive rains provided the soil is well drained. An instance of this was observed at Banyan in 1921, where a perfect sample of the Red Cross variety was seen which had experienced a fall of 120 in. of rain in the growing period.

Crops on a small scale have been estimated to produce 3 tons to the acre, and in the North field crops averaging 1 ton and over are not uncommon; but as a general rule, in satisfactory soils and under ordinary conditions with proper cultivation, 15 cwt. per acre might be expected as a fair average yield.

Where the crop grows to perfection, as at Cooktown and the Tableland, there is a fine opportunity for the institution of a co-operative oil mill and the purchase co-operatively of labour-saving machinery in picking, &c. In the growing of peanuts for marketing as whole nuts, it frequently happens that the product is not readily saleable owing to stained shells, glutted market, or other causes, when the presence of an oil mill will be advantageous.

The districts mentioned are in a particularly good position for the establishment of an oil mill, since freight on the whole nuts to the Southern parts is high and a ready market for the cake is to be obtained from the dairymen and pig-raisers near at hand.

FARRER'S METHODS.

SOME RESULTS OF HIS WORK.

J. P. SHELTON, M.Sc., B.Sc. Agr., Plant Breeder.*

No excuse is needed for drawing attention to the work and results of the Australian wheat-breeder, W. J. Farrer. The development of this country as a factor in the civilised life of the world and its growing importance in the international problems involved is largely based upon his work. The introduction of what are always known as "Farrer varieties" has greatly facilitated the transition from the pastoral to the agricultural phase in those vast regions of eastern Australia which constitute the present wheat belt. In 1890 *New South Wales produced* 3,649,216 *bushels of wheat; by* 1920 *this had been increased to* 53,715,840 *bushels, while for Australia the total production had increased from* 27,118,259 *to* 144,243,734 *bushels. These enormous increases have been due to two factors—Farrer varieties, and the improvement in cultivation methods, including fallowing. These have brought under the plough large areas in which low rainfalls had previously been a limiting—almost an inhibiting factor.*

A few biographical notes will be of interest, and will emphasise on what slender threads the fortune and progress of nations may hang. William James Farrer was born in 1845 in Westmoreland, England, his father being a country gentleman. Educated at Christ's Hospital Blue Coat School, he proceeded to Cambridge University where, after obtaining honours in the Mathematical Tripos, he studied medicine for a year. Ill health caused him to abandon medicine, and he sailed for Australia in 1870. There can be no doubt that Farrer's ultimate success in wheat-breeding was, to a large extent, the outcome of his early scientific training, which developed in him a logical clarity of thought that later enabled him to place his breeding work upon a systematised and logical basis. In Australia, financial reverses caused him to abandon sheep raising for work as a licensed surveyor. In 1886, Farrer retired to him farm home at Lambrigg, near Queanbeyan, where he engaged in wheat-breeding as a hobby until 1898, when he joined the New South Wales Department of Agriculture as Wheat Experimentalist at the age of fifty-three years, solely that he might have additional facilities for that work in which he had become so engrossed. He died in 1906, by which time many of his productions had come into general cultivation.

In 1890 wheat production in New South Wales was practically limited to the tablelands and the immediate western slopes of the main dividing range. The varieties in general cultivation were the so-called Purple Straw varieties, whose exact origin is unknown, but which were most probably local selections from English varieties originally introduced. Factors limiting production in these districts were:—

1. Loss due to Black Stem Rust. The varieties in cultivation were very susceptible to attack. The general conditions in the regions involved favour rust development, and at that time climatic conditions for a number of years were extremely favourable to the rust fungus.
2. The Purple Straw varieties were late maturing in their habit, which rendered them liable to suffer heavily in grain yield and quality when attacked by rust, since the disease usually developed at a critical stage in grain maturation. The long season, moreover, rendered the varieties particularly liable to suffer from the hot dry spells so frequent in November and December, which cause a shrivelling and pinching of the grain of varieties not far enough advanced in grain formation.

The spread of what-growing into the more arid western districts was limited, so far as the prevailing varieties in cultivation in 1890 were concerned, by their long season of growth; for the more extreme climatic conditions rendered all the more serious the liability to drying off of grain (and even of entire plants) in November and December. Moreover, the general absence of resistance to drought of the Purple Straws renderd them unsuitable for general cultivation except in very favourable seasons.

* Paper read at the Pan-Pacific Congress, Sydney, 1924—(Reprinted from the "Agric. Gazette" of N.S.W. for June).

The Rust Problem.

Farrer was first attracted to wheat-breeding by a controversy in regard to rust. His aims and methods can well be told in his own words in letters written to Mr. M. A. Carleton, of the United States Department of Agriculture, about 1894. These letters form a part of a complete file of the correspondence Farrer conducted with the cerealists of the United States Department which has been generously presented to New South Wales by the Secretary of Agriculture of that country, and which now is deposited in the Mitchell Library:—

> "Few farmers who have had experience in growing different kinds of wheat will deny that they differ in the resistance they offer to rust. In order to be able to improve a plant in any given direction it is only necessary that it should possess a tendency to vary in that direction. Variability being given by means of selection and by expedients in breeding man can work wonders (these are almost Darwin's own words). It is solely in consequence of the fact that the wild species from which they have been derived possessed a tendency to vary in the directions in which they have been improved, that we have succeeded in getting most of our beautiful garden flowers, of our luscious fruits, of our succulent vegetables, and of our excellent and most promising grains from unpromising individuals. It is by selection, either natural or intentional, or both, that we have become possessed of our blight-proof or blight-resistant apples; of varieties of the grape which are not affected by oidium, which resist mildew, and which possess roots that the phylloxera cannot injure. What is to stand in the way of our taking advantage of the variability as regards the amount of resistance they offer to rust that our wheats exhibit? In effecting this improvement we have everything on our side, since wheat is a plant which reproduces itself at an early age and at short intervals, since a single individual produces a large number of offspring at a time, since our chances of selection are much enlarged by our being able to grow a large number of individual plants to select from, and since the chances of spontaneous crossing between different individuals are remote and little likely to interfere with us in our work of hybridisation and selection. We have also on our side to help us the general principle that a quality which is being cultivated or secured through its variability tends to go on varying in the direction in which it has already varied. It is not in the direction alone of getting varieties possessing increased resistance to rust that I consider the improvement of wheat possible or desirable. It is possible to effect other improvements. Varieties, for instance, differ largely in the content of the grain in gluten. In that respect, also, they are variable and are therefore capable of improvement. We have an example in the sugar beet that an improvement of this character can be effected."
>
> "In regard to the next part your Department will be able to effectually take in providing the different sections of your territory with improved varieties, I would suggest that you should give your main strength to studying the physical qualities that are associated with resistance to rust, and most probably help largely to give that quality; and that you should make crosses with the object of combining in each variety made by you as many as possible of the qualities you observe to be rust-resistance-giving, combined of course in the highest degree, with richness of the grain in gluten and with other qualities which are wanted in a wheat. But as the possession alone of physical resistance-giving qualities is not sufficient to give resistance to rust everywhere and must be accompanied by constitutional fitness in the variety for the climate of the section in which it is grown, it is necessary that the fixing of varieties be done in the sections where the varieties are to be grown on a large scale."

In passing, it is of interest to note that the Minnesota researches, which have indicated the existence of extreme biologic specialisation within *Puccinia graminis tritici,* furnish the explanation of the apparently promiscuous variations in resistance of any one variety from district to district observed by Farrer.

The Extension Westward of the Wheat Belt.

From the rust problem Farrer was led on to general improvement and the production of varieties adapted to the more arid regions beyond the wheat experience line of that period. He early realised the value of early maturity as the *sine qua non* which was fundamental to the improvement and expansion he sought. Success in this direction, and the consequent spread of cultivation into drier areas, has reduced the rust problems to a very great degree—a reduction which has been accentuated by a run of dryer seasons. Farrer himself lost touch with rust work completely in the last ten years of his career, through the vagaries of climate. Rust liability has

been largely decreased by the use of Farrer's improved varieties, because they are early maturing. Thus, when rust does become prevalent, the varieties have usually reached a point sufficiently late in the process of maturation so that they do not suffer in grain yield or quality to any extent.

A detailed account of the crosses Farrer made cannot be given here. In his time he made many hundreds of crosses of greatly varied parentage. However, the varieties which have come into most general cultivation were largely the outcome of crosses made between varieties of the New South Wales Purple Straws, the Fife wheats, and the Indian wheats. A general statement will give some idea of the principles involved in this tripartite system of crossing, and the recombination of desirable characters likely to result therefrom.

The first line of systematic crossing was between Fife and Indian wheats. The characteristics of Fife wheat were strength of flour, long season, good straw, and liability to shelling. The characteristics of Indian wheats were drought resistance, early maturity, weak straw, but short and sparse, though holding the grain firmly. Neither Fife nor Indian wheats were suitable for general cultivation in New South Wales. The crossing of these varieties produced the following wheats:—Jonathan, Early Jonathan, Comeback, Cedar, John Brown, &c. These wheats combined in general the following characteristics:—From Fife parent, strength of flour, strong straw; from Indian parent, early maturity, sparseness of straw, drought resistance, and non-shelling of grain.

For a time these wheats were very popular. They were distinctly more profitable than the old Purple Straws in most districts on a run of seasons. Farrer used these "Fife-Indians" in breeding further new varieties, which displaced them from general cultivation. The Fife-Indians were crossed with Purple Straw varieties and other selected varieties to evolve varieties which, compared with the Purple Straw parents, were earlier in maturity and more drought-resistant, with sparser straw and non-shelling. The strength of straw was also increased. The quality of flour strength was decreased to a fair extent, however. These new varieties are now almost exclusively cultivated, if there be included in the list those bred on similar lines since Farrer's time. Varieties of such breeding were:—Federation, Yandilla King, Hard Federation, Major, Bunyip, Genoa, Florence, Firbank, Warren, Thew, and Canberra.

The simplest example of this tripartite crossing, and one which is free from the back crossing and composite crossing, to which reference is made later, and which marred much of Farrer's work from the view-point of modern genetics, is that which gave rise to the variety Federation, so popular to-day. Improved Fife and the Indian variety Etawah were first mated to produce the Fife-Indian variety called Yandilla. The common Purple Straw was then mated with Yandilla, and from the progeny Federation was selected.

Farrer produced thirty-three varieties which at some time were recommended for, and were in general cultivation. Of these, fourteen are not now grown, and five are grown only to a limited extent. The remaining thirteen include most of our standard New South Wales varieties of the present day.

Bunt-Resistance another Objective.

Bunt-resistance was a character for which Farrer largely worked at one period, and he succeeded in obtaining it in a large degree in breeding Florence. His work in this problem was detailed and extensive, and all his selections were made from trials of fixed and unfixed strains in which the seed was thoroughly inoculated with bunt spores. For detailed investigation this work compares well with the rust-breeding work being carried on at Minnesota.

Farrer's Work and Modern Genetics.

The analysis of Farrer's work on a basis of modern genetic knowledge is of great interest. It can, however, be done only in a general way, for the notes left are very meagre. He himself made only three references to Mendelism to my knowledge, and these occur in his letters to Professor R. H. Biffen, of England, who first applied the Mendelian theory to practical breeding. He wrote, 8th March, 1905:—

> "In your letter you speak of the old bugbear of fixing varieties. This work for the last twelve or fourteen years has given me no trouble whatever. It seems to me from what I can see of Mendel's theory of heredity, that the consideration I then gave to the matter of fixing varieties led me to adopt the system, which, for all practical purposes, Mendel's theory indicates as being the best. The practice was adopted from what appeared to me to be common-sense considerations. I certainly had not Mendel's theory to work upon."

In writing to Mr. Carleton, of the United States Department of Agriculture, on 18th March, 1905, he said:—

> "I am just now in the throes of mastering Mendel's laws, the practical application of which I have been following for about a dozen years; if selecting a number of plants, planting the seeds from each in separate drills, and selecting the drill which produces a uniform type constitutes a practical application of this theory."

It may be said that Farrer possessed a knowledge, gained by experience, of some of the main generalisations of Mendel's theory, and that his work was based upon such a system. The main generalisations of the theory from the point of view of the plant breeder are stated by H. K. Hayes, "The Breeding of Crop Plants," to be—

1. Plants breed true for certain characters when all factors necessary for the development of the character are in a homozygous condition.
2. There is independent segregation of certain factors.
3. Partial coupling of certain determiners sometimes is found. The degree of linkage in transmission is quite constant.
4. Perfect coupling of certain factors occurs, *i.e.*, constant association of characters in inheritance.

In 1896 Farrer wrote the following statement in his report to the Fourth Rust in Wheat Conference, which indicates that he was quite well acquainted with the phenomena of segregation and recombination of characters in crossing, though he had no knowledge of the exactness of the recombination nor of the definite basis on which new types could be looked for:—

> "In order to combine the qualities of earliness of maturity and resistance to rust in one variety by means of cross-breeding, late rust-resistant and early rust-liable sorts, as I have already pointed out, have to be mated. It will be well to pause for a moment and consider what we ought to expect from the union of types which differ so widely in these two qualities, as well as in others, such as the relative hardness, size, character of the grain, &c. What we generally see in the analogous case of the animal kingdom, with which we are more familiar, is that when parents, which are not closely similar, are united, if the progeny be numerous, certain individuals inherit some of their characteristics almost entirely from one parent combined with other characteristics which they have inherited almost entirely from the other parent; whilst as regards a majority of their characteristics they are intermediate in various degrees between both parents; and when this happens in different degrees and in a different manner with all the progeny, it will be seen how it comes that no two individuals of the same parentage are ever exactly alike, and that the greater the dissimilarity of the parents the greater will be the difference between the offspring of the same union. I will attempt to illustrate briefly what I mean, and for this purpose will make the case as simple as I can, and apply it to the subject we are actually dealing with.
>
> "Suppose I have mated a rust-resistant-late with a rust-liable-early variety of wheat. The greatest diversity of types will be shown by the offspring which grows from seed of the first generation of the cross from such seed as I am distributing. Suppose we have 100 plants growing from such seeds, which are of the same parentage. Out of this number I would expect there might be one or two—say one—which has inherited in a very high degree, possibly in as high a degree as the parents themselves possessed them, the qualities we are seeking to secure from both parents. A few more—five—I would expect to inherit high rust-resistant power from one parent, associated with moderate earliness from the other; and five more to inherit a high degree of earliness with fair rust-resisting power. The remaining eighty-nine I would expect to inherit these qualities in various degrees intermediate between the two parents; and something of this sort is what I find actually to occur in most cases. The work, then, of the person whose business it is to make use of these 100 plants is essentially the work of selecting as many of these eleven plants as promise to fill our requirements, and that work, as I have found out from actual experience, requires for its successful performance a close attention, care, patience, thoroughness, and system."

Professor R. D. Watt, of Sydney University, in commenting upon this statement, has drawn attention to a concrete example of recombination of characters obtained by Farrer. The comment is quoted from Science Bulletin No. 22 of the Department of Agriculture, New South Wales, "William J. Farrer, and the Results of His Work," by F. B. Guthrie.

This quotation shows that, although Farrer was at that time in ignorance of Mendel's historic experiments, he was working more or less along Mendelian lines—

for the main practical lesson of Mendelism is that, if two varieties of any crop, each of which possesses one desirable and one undesirable character, are crossed, there will appear among the progeny one or more individuals possessing the two desirable characters, and that some or all of them will breed true to both these desirable characters. The proportions mentioned by Farrer do not agree with Mendel's figures, probably because resistance to rust (*Puccinia graminis*) is not a simple Mendelian factor in inerritance:—

> "Two instances of Farrer wheats may be quoted to show how Farrer used something very closely akin to the Mendelian method. Of the many varieties he had at his disposal, a crossbred called Maffra was noted for its early maturity, which was its main asset; Zealand was one of the best late maturing wheats for hay, and Rymer one of the best late maturing prolific grain yielders. Farrer desired to get a variety of wheat suitable for hay which would mature sufficiently early to enable the farmer to have his hay in the stack before the grain harvest commenced. He therefore crossed Zealand with Maffra, and among the progeny he found a few plants which combined the excellent hay qualities of Zealand with the early maturity of Maffra. From these few plants he saved the grain and sowed it in small plots, found that it bred true, and thus he evolved the variety Firbank, which is still perhaps the best early-maturing hay wheat for New South Wales conditions.
>
> "His second objective was to get a prolific grain-yielding early-maturing variety; and so he crossed Rymer with Maffra. The result was Bunyip, which for a time was the most prolific grain yielder of all the early-maturing varieties, although it has been recently surpassed by newer varieties like Canberra."

Farrer's system of handling crossbred generations on a single-plant basis is the natural outcome of the first Mendelian generalisation quoted above—that plants breed true for certain characters when all factors necessary for the development of the characters are present in a homozygous or pure condition. Of homeozygosity, however, Farrer knew nothing.

The most striking points which the modern geneticist will notice in examining the pedigrees of the many varieties of which Genoa is representative are:—

1. The complicated nature of the pedigree and the frequent double use of a variety as a parent.
2. The frequent use as parents of unfixed crossbreds, often of the first generation, as stated by Farrer himself in writing to Professor Biffen. The pedigree of the variety Genoa is as follows:—White Naples was crossed with Improved Fife and an unnamed, probably unfixed, individual derived therefrom was then back-crossed with White Naples; an unnamed, probably unfixed, type resulting from the back cross was then mated with another unnamed, possibly unfixed, type derived from a cross between Improved Fife and Eden. The mating of the two unnamed types gave the well-known variety Genoa. Such a pedigree makes it apparent that Farrer had not a really clear conception of the definite segregation and recombination of characters as separate entities based on genetic factors. His concept in this direction was undoubtedly obscured by the prevalent idea that the double use of a variety as a parent, *i.e.*, a system of back-crossing, emphasised or increased the final development of these characters individually in the ultimate progeny. This idea is usually expressed in such terms as half blood, three-quarter blood, &c., of one particular parent being present in the ultimate progeny. Both the idea and the terminology are contrary to the present-day Mendelian concept.

Complicated composite crossing, particularly of unfixed types, is a practice quite opposed to those based on modern genetics, and indeed is in strange contrast to Farrer's own knowledge of the segregation of unit characters. It is largely based on the nineteenth century conception that crossing was of value mainly as a physiological stimulus that promoted variation of a quite promiscuous and ungoverned nature. Composite crossing aimed at inducing maximum variation in order to obtain a wide range of types for selection.

It is not suggested that Farrer could not obtain recombinations of characters by crossing F1 plants. The pedigrees of some of his best productions show that such recombinations were obtained—fortunately for Australia. But the mathematical aspect of Mendelism, based on the laws of chance, shows that Farrer undoubtedly reduced, in a very large degree, the chances of obtaining any desired recombination by crossing F1 plants, as compared with the crossing of fixed strains or pure lines possessing the necessary characters. On the other hand, when no fixed or pure line strains were available, any success resulting from Farrer's system saved several

years of patient labour, and expedited results by so much time as would have been necessary first to create and fix such varieties.

Perhaps the most interesting reference to Mendel's law made by Farrer occurs in a letter to Professor Biffen written in 1905. It contains a criticism of the theory which was later advanced by many critics, and which remained unanswered for a considerable period. Farrer's statement is here given in his own words:—

> "There is one point in connection with Mendel's law that it seems to me not to provide for. It is that when varieties, which differ sufficiently in type, are crossed, the variable generation seems to produce individuals which differ in all the qualities in which varieties differ, *e.g.*, by crossing two late sorts of different types it is quite possible to get early sorts. I cannot recall just now an instance in which I have got a very early variety in this manner, but I have made from such crosses varieties which are distinctly earlier than either parent. Mendel's law, I fear, is not likely to be of great use to me in enabling me to improve my methods, because, in nearly all the crosses I make, one of the parents is an unfixed crossbred, and frequently a plant of the first generation from the cross."

The statement that Mendel's law does not provide for cases in which the progeny of a cross includes individuals which possess characters not found in either parent was undoubtedly true as Mendel's law was then stated and understood. Subsequent research, however, has shown that some characters depend, for their full expression, upon the presence of more than one Mendelian factor. Thus late varieties are differentiated from early varieties by several factors. Where two late varieties are crossed, it is evident that different recombinations of the several factors for lateness may occur in the variable generation. Some plants will then contain less than the full number of factors for lateness, and will show a degree of earliness in correspondence with the decrease in the factors.

Farrer's case of the appearance of early wheats as the result of crossing two late wheats of different type is therefore not really at variance with Mendel's theory as now understood, although at the time his objection was perfectly valid.

Future Possibilities.

Any review of Farrer's work naturally leads on to a discussion of future development, and it is in this regard that discussion might well be engaged upon. At the present time it may be taken that we have in Federation, Canberra, Yandilla King, Clarendon, and several other varieties, wheats which are fairly well adapted in general habit to the climatic and soil conditions of a great area of wheat land, as yet only very partially exploited. They are also fairly well suited to the commercial requirements of our local and overseas markets.

Improvement, however, will result in the building up of these varieties on a single character basis. Characters may be added, such as resistance to prevalent diseases—flag-smut, take-all, foot-rot, and rust in certain districts. The question of yield, particularly in relation to earliness of maturity, has by no means been solved, but it is a problem fundamental to the breeding of wheats for the drier regions beyond the present wheat belt. Also, yield in combination with superior grain quality is a matter for further investigation. Particularly bound up with the inheritance of disease resistance is the problem of the linkage of resistance factors with those which give expression to commercially or agronomically undesirable characters. Such linkage may be complete or partial. Only genetic experiments can give the answer, yet on the answer depends the possibility of future progress. This is well illustrated in the Minnesota work on rust-resistance, where the linkage between resistance and Durum type was proved to be not absolute, as at first thought, and thus not a bar to the breeding of rust-resistant bread wheats. Again, the problem of partial sterility in species crosses in one which must be investigated before improvement in certain desirable directions is completely possible. Sterility of this kind has undoubtedly a genetic basis, and investigation may indicate systems of crossing which will overcome the difficulty.

These matters, being briefly given, indicate the necessity for a genetic analysis of the genus *Triticum* before the best progress may be expected. We must know what the genus really contains in the way of inheritable or genetic characters, and the behaviour of these characters in regard to inheritance, before we can visualise what improvements are possible, or be in a position to combat the difficulties that nature throws in our way in seeking that improvement. For instance, we do not yet know what varieties or species show any resistance to take-all or foot-rot, and only partially so in regard to flag-smut.

Yield, as an expression of complex genetic factors in relation to the environment, seems a hopeless problem to attack in an experimental way. Yet all breeders are

convinced that they have discarded what would have been valuable strains, simply through an inability to see beyond the temporary effects of a reaction between a valuable complex of factors and a temporary unfavourable environment. Something more definite as a selection index is needed than is obtained by eye-inspection and arbitrary evaluation, even by men with the so-called "eye" for a good wheat. Such a standard has been sought from time to time, and there is great need for further work in correlating potential yield with individual characters or groups of characters of a morphological or physiological nature.

The migration ratio of Beaven, which has some experimental basis in regard to the behaviour of pure lines or fixed varieties, may eventually prove applicable on a modified basis to individual plants of an unfixed crossbred generation.

Again, the relation of transpiration ratio to yield has not yet been investigated sufficiently in regard to different varieties of any one crop. In this country, Dr. Richardson, of Victoria, has done valuable preliminary work upon the differences in transpiration radio of various crop plants. To be valuable to the breeder, this work must be carried out with many varieties of one crop, such as wheat, so that definite correlations may be found, should they exist. There may thus be provided some experimental basis for using the transpiration ratio as a partial index of potential yield with individual plants.

I am well aware of the immense experimental difficulties that lie ahead in such work, and the great amount of experimental error involved in applying general principles to individual plants. These problems are, however, worthy of investigation if plant-breeding is to evolve as a more exact science. The handling of the third generation of crossbreds in pots in the glass house at Minnesota in regard to rust-resistance work is an example of progress that may be looked for. It has placed the testing for resistance in a variable generation upon a definite laboratory basis.

The extracts from Farrer's own letters, which have been presented in this paper, show that his work was based upon an immense amount of preliminary observation and speculation. Breeders of this generation must attack their problems in the same way.

GUMMING OF DRUPACEOUS FRUIT TREES.*

By HENRY TRYON, Government Entomologist and Vegetable Pathologist.

This malady is one that affects alike the plum, peach, apricot, nectarine, and almond, and also cherry amongst deciduous fruit trees, and although what is now written has been suggested by inquiries regarding gumming in the plum it applies also with minor qualifications to this affection in the others also.

Gum Formation.

It occurs under two forms, that are alone distinguishable by the history and sites of its occurrence on the tree victimised, one of which is of parasitic origin, and the other simply due to chemical change, independent of the occurrence of micro-organisms generally, and that may be termed physiological. At the base of the old fruiting spurs, on which earlier "Brown Rot" affected fruits have occurred, and where gum that has issued in droplets may be met with, this is to be attributed to the fungus occasioning this malady; and other forms of gumming of parasitic origin too may also be encountered. Usually, however, it is gumming of non-parasitic origin that is met with; but the gum itself being a good medium for the growth of micro-fungi and bacteria and readily imprisoning their air-borne "germs," one form may readily pass into the other.

The gum itself is really a product of a chemical change undergone by the cellulose component of the cell-walls of the woody tissues—those of the vessels and fibre as well as of the cells proper. This transformation is due to the action of bodies, named enzymes, and particular kinds of those (pentoses) that may be secreted by living parasite organisms, or even by the plant itself growing under normal as well as under abnormal conditions. In fact, in the former case we have what is termed "gummification," in the latter "gummosis." The ordinary mechanical wounding of the tree gives rise to a form of gumification, the gum production under this circumstance being the first act in a spontaneous reparative process. The gum itself simply consists of carbohydrates named pentosans that accompany sugars when celluloses are broken down.

* *Note.*—This memorandum originated in reference to the occurrences of serious gumming of plum trees in the Broadwater district of the Stanthorpe area—a not uncommon incident elsewhere in the district however—by Mr. Hubert Jarvis, Official Entomologist, in a communication dated 22nd June, 1925.

The Plum.

The gum production in this (as is shown in the specimens submitted) forms pockets beneath the outer bark of branches of almost all ages giving rise to swellings that yield to pressure and are quite evident even before the gum itself issues in the form of drops and masses that darken and harden.

On cutting downwards through them, not only is the presence of this body, now in a fluid condition, brought to light, but distinct discoloration with other noticeable features of change are discernable, this extending to the fibro-vascular bundles and wood-cells beneath, that have become first yellow then reddish-brown in colour, at the same time being both infiltrated with the gum alluded to, the alteration between sound and affected tissues being quite remarkable.

As these changes have proceeded it is evident, especially when the microscope is used, that the cambium has become involved, and that this through its activity has formed special developments of wood-cells, that in turn have gradually become transformed into gum by the dissolution of their walls, and that the new material not only produced the swelling but that also the gum is filling channels passing through the discoloured but still intact tissue beneath.

The principal mass of this so-constituted stem swelling in each case has, it will be seen, emanated from the under bark, the secondary cortex, and is evidently formed not only from the newly laid down thin walled wood-cells, but also by the gumification of the thick-walled bast fibres, both of which undergo the destructive modifications alluded to. In fact, only the outer bark, the periderm, is spared, although this may soon become fissured by pressure from beneath.

At first there are dark borders isolating the sound from the altered tissues, but the latter may become more and more extensive until the branch or branches implicated succumb. Commonly, however, if an outlet can be made for the gum as it forms and the conditions are favourable to growth, the cambium will produce wound tissue and so bring the destructive changes to a standstill, with the result that tree-growth is resumed, the injuries being healed.

The distinction between the disease presenting these symptoms, *i.e.*, gummosis, and mere gummification, is that in this we have new tissue formed by the active cambium that may become transformed to gum, whereas in the latter a mere change in that alone forming portion of the ordinary tissue, and that may arise suddenly and may even spontaneously disappear in course of time.

Conditions of Occurrence.

There are three conditions governing the occurrence of plum trees gummosis in the Stanthorpe district, all of which, however, may have some connection, one with another. These relate to—

(1) Meterological factors,
(2) Soil factors,
(3) Trees, grafted or otherwise,
(4) Nature of plum stocks, and
(5) Plum variety.

(1) Meterological factors.—Warm wet weather succeeded by sudden coldness may be regarded as contributory factors, whether operating through the medium of the soil or otherwise (*vide* 2).

(2) A soil derived from the disintegration of granite and near where it has originated seems to be most favourable in the Stanthorpe area for plum-tree raising. This is, however, very conducive to gum disease (a remark that applies to other soils) where it is liable to become water-logged, or exhibit features of ill-drainage implying bad subsoil aeration generally.

(*Note.*—Owing to the character of the base formation of the orchard lands, that is often characterised by underlying rock in which shallow depressions occur or bars that hold back water are present, both masked commonly by the circumstance that the surface contour is level or even evenly sloping, ill-drained areas occur that are very conducive to gumming in the orchard and will continue to be so until the conditions are ameliorated by tile drains.)

(3) It is usually found that plums, many of which can be grown directly from their own wood without detriment to the quality (and quantity) of the fruit yielded, are less liable to gum disease when grown on their own roots than when worked. This fact has been especially recognised in Italy, where the trees are commonly raised from *polloni* or root suckers (that as is well known arise from the main roots some distance from the tree trunks) and used in orchard work where conditions generally favour the presence of disease.

(4) The character of the stock.—Plums worked on peach stocks are much more liable to gumming generally than are those raised on plum stocks in the Stanthorpe area. This may be due to the more exacting special soil conditions of the peach, that cannot thrive in wet or ill-drained subsoils. Some strong growing varieties, such as Black Diamond and Denison's Superb, however, are less liable to develop gumming when grown on peach stock there than are others. Again, trees on American plum stocks (such as a Red Plum) seem again to be characterised by greater freedom from gumming than are others.

(5) The early Orleans plum seems to be very susceptible whether worked on peach or English plum, but does better when worked on Red Plum, and this remark applies also to the Yellow Magnum Bonum variety.

(*Note.*—These remarks relating to nature of stocks are, however, not a generalisation based on a sufficiency of local data.)

Remedies.

Preventive.—These may be concluded from the foregoing remarks made under 1 to 5.

Direct Treatment.—(1) When the disease is first appearing and it is commonly evinced very early by a yellowing or mottling and partial shedding of the foliage, benefit will be derived from deeply working the soil, and exposing the root system to some extent, and a general endeavour to aerate, sweeten, and generally drain the soil from which it is drawing its soil-yielding water supply nutriment. (2) Then freely slashing longitudinally the bark with a special knife, so as to reach the cambium layer. This will secure the prompt issue of the gum that is forming and so stay its further increase and pernicious action.

BANANA—INTERNAL FRUIT DISCOLORATION.

Mr. Henry Tryon, Government Entomologist and Vegetable Pathologist, supplies the following answer to an inquiry from a North Coast correspondent:—

The banana trouble illustrated by the specimens sent down, and that show—in comparison with perfect and sound fruit—its injurious features, is one that I am already familiar with, although of late it has not come under my notice.

Nature.

It is characterised by an arrested development of each banana fruit affected, those evincing it being distributed amongst different hands in a bunch, being even restricted—as often as not—to one or more fruits in a hand, and by those bananas showing it being characterised by the persistence of the angular ridges of unfully developed fruit, their somewhat compressed shape, and a slightly paler cast of colour, features that distinguish them from the surrounding sound fully developed fruits amongst which they occur. Not only all the bananas of a hand may be affected at times, but even a large proportion of a bunch. A more noteworthy feature, again, is found in the fact that on cutting such fruit through lengthwise or across, or even breaking it through, a band of reddish discoloration extends through the centre from the tip towards the base, passing outwards and involving more or less of the substance of the fruit then beneath the skin. This change is, however, not only this conspicuous one of colour, but a more or less breaking-down of tissue may occur, the firm axis of the fruit being transformed to an almost liquid dark reddish-brown substance now occupying a channel or cavity.

An occurrence of such fruit I have found formerly, in the North, to extend almost through a plantation, but there and elsewhere to be prevalent principally during the winter months—June, July.

Proximate Cause.

This cannot be fully explained without going into some technical details, using too certain special illustrative figures, both of which must be for the present withheld. It may, however, be now remarked as follows:—

The commencement of the trouble must be looked for already when the banana is blossoming, and when the blossoms with the parts that are to become the fruit

are being uncovered, hand by hand, with the opening of the large bracts that have previously protected them.

Then will be observed towards the base of each flower tube (perianth) on its external surface little globules or blebs of a yellowish tourbid gum-like exudation of different sizes that seem to be issuing from minute coloured fissures. Later the droplets of gum—at first quite limpid—thicken and will be seen to have changed to a dark rust-red colour, or further still have become black, eventually hardening. Meanwhile the flower itself at the place where these occurrences are happening also gradually prematurely darkens, as if burned, and shrivels up. Meanwhile, too, there has been a similar but reduced issue of gum in the inner face of the flower tube involving the slender pistil that extends throughout its centre and ends in the oval stigma above. So also is the top of the young fruit involved, that may become brown and shallowly fissured.

In spite of these changes, the fruit goes on growing to perhaps nearly full size, but the dry shrivelled blackened flower seems to remain attached always longer than when it does this and is not at all affected. Moreover, in some banana fingers this may be the case without further changes being undergone.

The further phenomena that the fruit witnesses and that constitute the injurious features above described result from the following circumstances:—In the banana fruit a narrow channel passing down along the centre of the columnar pistil—and that needs a microscope to discover—is continued through its swollen base, through the tip of the fruit, after which it widens out, and then narrows again, and so continues along the middle of this to its base. Usually the portion of the channel in the fruit closes and obliterates as the starch-laden tissue of the fruit develops inwards towards the centre; soft yellowish and gelatinous at first, then firm and whiter eventually. However, with the slower fruit growth of winter it remains longer open. Meanwhile the thin gum, or the active principles entering into its composition, find their way from the flower along this channel and not only prevent internal growth, but also cause destructive changes, accompanied by discoloration of and some breaking down of tissue. At the same time, the central channel being connected with three narrow fissures that pass outwards from it towards the rind, the outer parts of the firm substance beneath this also become involved in the trouble. It has been remarked above that the central channel widens out at a point just behind the end of the finger. Here the walls of it, and of their three radiatory connections, are thickened and puckered and seem to reinforce the active principles as they proceed downwards along this line of communication.

Even when the fruit is only partly grown a series of cross section may disclose the fact that its tissues are already injured.

Primary Cause.

The explanation of the origin of the gum exudation from the flower, and so of the prime cause of the trouble, is somewhat a matter of conjecture.

In affected plants that we examined some years since in the Cairns district, the roots showed numerous dark lesions in their course, special nematodes sometimes occurring in the purplish blackened shrunken dead tissue. But any connection between this occurrence and the fruit trouble under notice could only be due to obscure constitutional changes in the plant, since no visible connection was traceable from one trouble to another in its tissue, even in that of the stem of the fruit. However, banana-growers have dwelt upon the fact that the pseudo-stems of affected stools develop black patches on their outsides to an undue extent.

We have also found insects (Thrips) commonly early occurring within the perianth tube of affected flowers, and that in feeding might injure it at its base.

And again the minute skin-cracks through which the gum, when first observed in the recently exposed flower issues, suggest the action of sudden meteorological changes on the tissue, especially as it is in the season when such are experienced that the manifestation of these troubles is most pronounced. The gum exudate does not appear to correspond to a bacterial slime.

Remedies.

Unfortunately we cannot at present suggest, as the outcome of reasoning or of experience, how this serious fruit trouble is to be prevented.

QUEENSLAND FORESTS AND FOREST TREES.

By C. T. WHITE, F.L.S., Government Botanist.*

Queensland has the most richly endowed tree flora of all the Australian States. Probably more than one-half the Australian species of trees occur in Queensland. Queensland is the only State in the Commonwealth with forests extensive enough to supply practically all local softwood demands.

Queensland Woodlands.

The vegetation of the world has been roughly classified by botanists into the three main divisions of Grassland, Woodland, and Desert. Of these only the first two occur in Queensland. We have, it is true, country popularly called desert, but in reality this is a form of woodland, as it not only contains various species of grasses and herbage, but also a few small trees and shrubs. What is called desert in Queensland is, as a matter of fact, extremely interesting country from the point of view of the botanist.

Natural grasslands of very extensive range are represented in Queensland by the Rolling Downs Formation and covered by Mitchell, Flinders, and other grasses and herbage characteristic of Western parts of the State.

The Woodland areas or forests can be divided along broad lines into several distinct types:—(1) The Littoral or Coastal forests, (2) the Open Eucalyptus forests, (3) the Vine Scrubs or Jungles (known to the botanist as rain forests, (4) the River forests, and (5) the Inland Scrubs.

The Littoral forests are of two main types. The forest below high-water mark (mangrove forests), and those above high-water mark (beach forests). The mangroves are extremely interesting trees, showing a wonderful adaptability to the hard conditions under which they grow. Their roots not only act as a means of anchoring the trees firmly in the muddy substratum in which they grow, but the parts above water also act as breathing organs. They are covered by breathing apertures known as lenticels, are of a spongy nature, and through the lenticels communication with the atmosphere is maintained. This is very essential, as the trees are growing in a very badly aerated soil, and unless communication between the subterranean roots and the atmosphere was established in some way the trees would become suffocated. The fruits are also peculiar from the fact that germination takes place while still on the tree, and the young plant is ready to anchor itself in the mud as soon as it drops from the parent tree; if this did not happen the seeds would become washed about from place to place and difficulty would be found in obtaining a footing.

Common Mangroves of the Queensland coast are the Red Mangrove (*Rhizophora*), the Black Mangrove (*Bruguiera*), the small Mangrove (*Ceriops*), the White Mangrove (*Avicennia*), and the Milky Mangrove (*Excœcaria*). The first two are of some importance as tanning agents, but they have not found general favour amongst tanners in Australia owing to several disadvantages. These disadvantages can be overcome, but the expense in doing so apparently does not compensate tanners for the trouble involved.

The White Mangrove is one of the few species of mangroves that extends outside the tropics, being common all round the Australian coasts, and extending to New Zealand. The bark of this tree has no value for tanning purposes, but the leaves are of great value as a forage, and in times of drought in coastal areas the White Mangrove has saved many head of stock.

An interesting member of the mangrove flora in some parts of North Queensland is the Nipa Palm. The Nipa Palm is at present confined to a few parts of North Queensland, the Pacific Islands, and Tropical Asia, but at one time evidently had a wide range over the regions of the world, as nuts in a good state of preservation are commonly found in the Tertiary deposits at the mouth of the Thames in England. Where it grows the leaves of the Nipa Palm are preferred above all others as thatch for native houses.

The Littoral forests above high-water mark are of two types—those of the dry land, and those of the swamps. Those of the former are again divided into two types—(1) those of the ocean foreshores, and (2) those of the bay foreshores. The

* Résumé of lecture delivered before the Queensland Forestry Association, 10th June, 1925.

two outstanding trees of the ocean foreshores or sand dunes of Eastern Queensland are the Coast Oak (*Casuarina equisetifolia*) and one or two species of Pandanus. The latter show great adaptability to their environment, for they are provided with prop roots, which anchor the trees very firmly in the loose sandy soil in which they grow. These prop roots are essential, as the large leaves and the large heavy heads of nuts are borne at the extreme ends of the branches, and but for these roots the trees would very easily be blown over by the high winds which prevail on the coast.

Another tree often seen on the foreshores immediately behind the dunes is the Sand Cypress (*Callitris arenosa*). When growing in such situations it is usually rather dwarfed, and the tops cut off in an oblique direction by the prevailing winds, giving the crown a sloping appearance.

Common trees on the bay foreshore often just above the mangrove formation are the Cotton Tree (*Hibiscus tiliaceus*), and the Cupania (*C. anacardioides*). The former has a greenish timber, unique in colouring among Australian woods.

The two most abundant trees of the coastal swamps are the common broad-leaved Tea Tree (*Melaleuca leucadendron* vars.), and the Swamp Oak (*Casuarina glauca*); the latter possesses a beautiful timber very suitable for many general purposes, and also for heavy cabinet work. It may be worth mentioning here that the name of the former tree is usually misspelt Ti-tree. The origin of the name is that leaves of an Australian species of Leptospermum were used on Captain Cook's third voyage to Australia as a substitute for ordinary tea, and the name Tea-tree has now become generally applied in Australia to plants of the two closely allied genera Leptospermum and Melaleuca.

Our Eucalyptus Forests.

The Open Eucalyptus forest (Savannah) is the main forest type of Australia. It varies a good deal according to situation, whether coastal or inland, northern or southern, whether occurring on deep and rich soils, or barren silicious ones, &c.

The outstanding trees of the Open Forest are the Eucalypts or gum-trees. The Eucalypts are, practically speaking, confined to Australia. Four or five species are found in New Guinea; of these one species is found in Timor, and another extends to the Southern Philippines. This latter is, however, the only species that is not actually found in Australia.

The leaves on most gum-trees are dimorphic, that is of two distinct types—(*a*) the leaves which occur on young trees and stump shoots commonly referred to as sucker leaves, and (*b*) the leaves on the adult tree. The former are commonly very much larger than the adult forms, they are often opposite and horizontally placed, and are supposed to represent the original type of eucalyptus leaves, the vertically placed leaves on the older trees having arisen in response to the dry conditions prevalent in a good many parts of Australia.

If a floral emblem was adopted for Australia, no better flower could be taken than the gum blossom. It is the flower of our most important group of timber trees; a group characteristic of Australia, and also, what is very important, is well adapted to design.

The Eucalypts can be classified roughly into about six groups: (1) The smooth barked species or Gums proper, (2) the Boxes, (3) the Stringybarks, (4) the ironbarks, (5) the Bloodwoods, and (6) the Mallees.

It is quite impossible to deal with all the species, but a few of the outstanding trees of each group might be briefly noted. Of the first group, one of the largest and most beautiful is the Flooded Gum (*Eucalyptus saligna*). This occurs not only in moist lowlands but is also very abundant in some of the mountain forests, such as Tambourine Mountain, Blackall Range, Atherton Tableland, &c., and its long, clean, straight boles are a characteristic and beautiful feature of the flora. It produces a useful general building timber.

The Queensland Blue Gum.

One of the commonest trees of the Open Forest in Queensland is the Queensland Blue Gum (*Eucalyptus tereticornis*). In Queensland this tree is known as Blue Gum, in New South Wales as the Forest Red Gum, and the name Blue Gum is given to the tree that we call Flooded Gum. This confusion of popular names is very misleading, and it is important that in the near future an attempt should be made to establish a standardised nomenclature for Australian timbers. The present confusion often leads to serious mistakes. For instance, outside of Australia the Australian Blue Gum is generally *Eucalyptus globulus*, one of the sources of commercial eucalyptus oil, and the oil of Queensland Blue Gum has been distilled, but when exported has been found not to come up to the standards required by the British and United States Pharmacopoeias, which require a certain cineol or eucalyptol content.

Spotted Gum.

The Spotted Gum (*Eucalyptus maculata*) is one of our most important hardwoods; it has an interesting geographical distribution. The common Spotted Gum is found in New South Wales and Southern Queensland, but about the Burrum River, in the Burnett district, the ordinary Spotted Gum ceases to exist and its place is taken by the Citron-scented variety (var. *citriodora*); one could almost draw a piece of string across Queensland where the species ends and the variety begins, though apart from the oil the two trees seem quite identical. This is the more strange, as the Citron-scented Spotted Gum, grown in any part of Southern Queensland or even as far south as Sydney or Melbourne from northern seed, always retains the strong citron-scented odour in its leaves.

Eucalyptus Oils.

The eucalyptus oil industry has never assumed the proportions in Queensland that it has in the Southern States. This is probably due to the fact that the cineol or eucalyptol content of the oils of most of our common eucalypts do not come up to the standard required by the British and United States Pharmacopoeia. On the other hand, we have a great number of eucalypts and allied plants which contain very strongly citron-scented or lemon-scented oils worth five or six times as much or more than the average eucalyptus oil produced in the Southern States. It is a remarkable fact that all eucalypts and allied plants yielding citron or lemon scented oils that occur in Australia are found in Queensland, *e.g.*, the Citron-scented Spotted Gum, Lemon-scented Ironbark (*E. Staigeriana* and *Backhousia citriodora*), and the Citron-scented Tea-trees (*Leptospermum citriodorum* and *L. citratum*).

Of the Boxes, the most abundant in Queensland is the ordinary Poplar Box or Bimble Box, which covers large areas of country in the interior parts of Queensland. The oil of this tree has a high cineol content, but occurs in such small quantities that distillation does not pay.

Valuable Hardwoods.

The Stringybarks are a big group, many being among the best of our general hardwoods. The three best known are the Red (*E. resinifera*), the White (*E. eugenioides*), and the Yellow (*E. acmenioides*), respectively. The Blackbutt and Tallowwood might be included in the same group. The last is one of the most durable of Australian hardwoods under exposure.

Of Ironbarks there are a great number of varieties, the two most important from a timber point of view being the Grey Ironbark (*E. paniculata*) and the Narrow-leaved Ironbark (*E. crebra*); probably the very best hardwoods that occur in Australia, and that means the best in the world.

The Bloodwoods contain the Red Bloodwood (*E. corymbosa*), the White Bloodwood (*E. trachyphloia*), several species of Yellow-jacket, and other trees. The Bloodwoods are amongst the most durable hardwoods in the State, but owing to the presence of gum veins are rarely sawn. They are, however, very largely used for houseposts, fencing, &c. Their tendency to shell off along the veins considerably shortens their life as railway sleepers, but even with this the Railway Department gives the average life of Bloodwood sleepers at seventeen years.

The Mallees are practically unrepresented in Queensland, only one or two species of mallee-like growth occurring in the southern part of the State, near the New South Wales-Queensland border.

A genus allied to Eucalyptus is Angophora, the two best known members of which are the Rusty Gum (*A. lanceolata*) and the Apple-trees (*A. intermedia* and *A. subvelutina*); they are not of much consequence as timber trees.

Two trees common in the forest country belonging to the genus Tristania are the Swamp Mahogany (*T. suaveolens*) and the Scrub Box (*T. conferta*). The former, as its name implies, is usually found in swampy country, but is certainly not confined to it, often being found in the ordinary open forest. It is the timber preferred above all others for piles and fender posts for wharves, being especially resistant to the attacks of the marine worm or Teredo.

The Scrub Box, as its name implies, is often found on scrub edges. Its timber is very little cut in Queensland, due probably to its tendency to warp in small sizes. In the Southern capitals it is very largely used as a street tree, being pollarded about 8 ft. from the ground, when it makes a fine, dense, shapely crown.

The Turpentines (*Syncarpia* spp.) are timbers that are in great demand for piles, and also for fender posts for wharves. They are rarely cut in Queensland, due to their tendency, like the Scrub Box, to warp in small sizes, but are highly useful,

very much under-rated hardwoods. One of the species is the Fraser Island Turpentine (*Syncarpia Hillii*), found in no other part of the State than Fraser Island, where it attains a large size, being one of the largest of Queensland hardwoods. Many hardwoods not cut in Queensland simply suffer in comparison with those of superlative qualities, such as the Grey and Narrow-leaved Ironbarks, whereas they are really excellent timbers, and occurring in any other part of the world would be regarded as hardwoods of extraordinarily high value.

An interesting member of the Open Forest is the Sandalwood (*Santalum lanceolatum*). It is not generally known that this tree is parasitic on the roots of other trees. The Sandalwood is common throughout western New South Wales and Queensland, but it is strange that the peculiar scent which gives it its very high value is only developed in northern parts, such as North Queensland, the Northern Territory, and north-west of Western Australia. The wood of the southern trees is almost or quite scentless. The main port of export for Queensland is Thursday Island. A tree that commonly goes under the name of sandalwood in western New South Wales and Queensland is *Eremophi'a Mitche'lii*, also known in the former State as Buddah. The wood is very strongly scented, but is of no value as a "sandalwood." Attempts to get it on the market have always failed. It belongs to a very different family to the true Sandalwoods. When the Sandalwoods were cut out from the Hawaiian Islands, attempts were made to substitute the wood of a tree allied to the Australian Buddah, and like it with a strong scent, but the Chinese buyers would have none of it.

Other trees making up the Open Forest are various Wattles (*Acacia*), Honeysuckles (*Banksia*), She Oaks (*Casuarina*), &c. One of the most interesting of these latter is the Thready Bark Oak (*C. inophloia*), which occurs in many parts of Queensland. A characteristic feature is that a broad band of exposed dead wood runs from top to bottom of most of the trees. The trees are usually of very small size with poor logs, but produce one of the most beautiful of Australian timbers, the beauty of the timber being due to the exceptionally large, broad, and deep medullary rays. Though not occurring in large sizes, it is well adapted for turning into small objects such as clock cases, serviette rings, walking sticks, &c.

Our Rain Forests.

The Vine Scrubs or Jungles reach their greatest development in Australia in Coastal Queensland. They consist of heavily dark foliaged trees, and an abundance of climbers, many of the trees produce huge plank buttresses at the base. It is rather unfortunate that in Queensland the name "scrub" should have become attached to this rich type of jungle, as the term "scrub," not only in other parts of Australia, but in other parts of the world, and also in botanical terminology, refers to low stunted vegetation, the direct opposite to that which occurs in the so-called Vine Scrubs of Queensland. The botanist refers to these Vine Scrubs as rain-forests, because they are mainly dependent on moisture—more dependent on moisture apparently than on soil.

The number of actually Australian types found in the Vine Scrubs is small, the majority of plants belonging to families, a good few to genera, and a few to species that are cosmopolitan in the tropics and subtropics, Asiatic types predominating. Interesting Asiatic types occurring in Queensland are Rhododendron and Garcinia (the mangosteens), which reach their southernmost limit of distribution in North Queensland.

On the other hand, the so-called Antarctic element reaches its northern limit in Queensland Vine Scrubs. An interesting example of this latter is the so-called Antarctic Beech, which is abundant on the Macpherson Range. It belongs to the genus Nothofagus, which is at present confined to South America, New Zealand, and finding its northern limit in Southern Queensland. Fossil evidence would show that at one time it was apparently common in the Antarctic continent, where at the present time only two flowering plants—a grass and a small herb—are found.

It is in the Vine Scrubs that our most important coniferous softwoods occur—the Hoop, Bunya, Kauri, and the She pines. The Hoop and Bunya pines belong to the genus Araucaria, at present confined to the Southern Hemisphere, but in past geological times the ancestors of our Hoop and Bunya and also Kauri pines had a very wide distribution over the world, extending northwards near to the Arctic regions. These trees possess softwoods equal to many and superior to most of the softwoods of the Northern Hemisphere; they fortunately do well under silvicultural conditions and make rapid growth. On Fraser Island recently I saw trees less than eight years old nearly 40 ft. high.

The name Kauri or Kauri Pine is nearly always associated with New Zealand. It is true that the New Zealand species was the first described, but whereas New Zealand only possesses one species, Queensland has no less than three, all attaining

a large size and producing most valuable timber. The Queensland Kauris grow rapidly under plantation conditions, but unfortunately great difficulty is experienced in obtaining a good seed supply.

The She pines or Brown Pines are very common in many of the Vine Scrubs of the coast. They produce excellent timbers, but are not of much consequence from a forestry standpoint, as the supply is limited, the trees are not large and growth under plantation conditions is slow.

The genus Flindersia (commemorating the name of Matthew Flinders, the famous navigator) is a genus of about twenty species, all except a few found in Australia, and all the Australian species are found in Queensland. It is an interesting exception as forming a large Australian group found in the Vine Scrubs. After Eucalyptus and Araucaria, Flindersia is probably the most important genus of Australian timber trees. It contains the Crow's Ash or Teak (*F. australis*), Yellowwood (*F. oxleyana*), or Cudgerie (*F. Schottiana*), Silkwood (*F. Pimenteliana*), Maple (*F. Brayleyana*), Cairns Hickory (*F. Ifflaiana*), and other timber trees.

Other cabinet woods of the Queensland Vine Scrubs are the various species of Silky Oaks, the Red Cedar (*Cedrela*), White Cedar (*Melia*), Rose Wood (*Dysoxylum Fraseranum*), Red Bean (*Dysoxylum Muelleri*), Black Bean (*Castanospermum*), Acacia Cedar (*Albizzia*), Booyongs (*Tarrietia*), Red Carrabin (*Weinmannia*), Yellow Carrabin (*Sloanea*), the Calophyllum, the White Beech (*Gmelina*), and a host of other timbers not yet fully tested as regards their economic uses.

On some parts of the Downs and a few other inland localities there is a type of "scrub" which, in addition to trees that also occur on the coast containing several distinctive ones, the most outstanding is the Bottle Tree (*Brachychiton rupestre*). Trees such as the Lignum-vitae, Crow's Ash, Booyong, &c., are usually much smaller than the same species in the coastal belt.

River Timber.

Along many of the Australian rivers, both inland and coastal, a number of trees occur that always follow the watercourses, being rarely found anywhere else, such as the River Red Gum (*Eucalyptus rostrata*), River Tea-tree (*Melaleuca*), River Oak (*Casuarina Cunninghamii*), Weeping Tea-tree, Weeping Myrtle (*Eugenia*), Gutta-percha (*Excœcaria parvifolia*), &c. Other trees such as the Bean Tree, Blue Gum, Lillypilly, &c., occur along the rivers, but are also found in the Vine Scrubs or Open Forests.

Western Trees.

Many scrubs in the western and northern parts of the State are often formed by particular species of Wattles such as the Brigalow, Mulga, Boree, and Lancewood Scrubs respectively. Another tree forming large inland scrubs and usually associated with the Brigalow is the Beelah (*Casuarina lepidophloia*). Associated with the various species of Wattles and the Beelah are other trees such as the Wilga, Emu Apple, Native Pomegranate or Bumble Tree, Mustard Tree, Myall, Whitewood, &c. A remarkable feature about many of the western trees is the high fodder value of their leaves, cattle being carried over long periods of drought on scrub feed.

The foregoing sketch has necessarily been very brief, for as Queensland possesses approximately 800 species of trees, it is obvious that only a comparative few can be mentioned in the course of a brief lecture.

VALUE OF AGRICULTURAL CHEMISTRY TO THE STATE.

E. H. GURNEY, Senior Analyst, Department of Agriculture and Stock.*

Many of the necessities of modern civilised life have become so familiar that rarely is thought given to the scientific achievement that has been necessary for their dvelopment.

The art of agriculture has been in existence since the very early ages, and at the present time the agricultural industry of a country is considered of the utmost importance; particularly so in countries with large areas of arable land still to be exploited.

The agricultural methods of to-day have been established, to a large extent, by the application of facts contributed by the different branches of Science—Chemistry, Physics, Botany, Biology, Engineering, &c.

* In a paper read before the Australian Chemical Institute (Queensland Branch), June, 1925.

The subject-matter of this paper is a brief account of the manner in which some chemical principles are made use of by the man on the land in his particular industry.

It will be in order to first consider some ways in which Agricultural Chemistry has given assistance in soil management—the soil being the source of all primary products.

It is now recognised that the fertility of the soil depends upon a number of factors, and for this reason the condition of the soil has to be considered from the chemical, physical or mechanical, and biological standpoints.

Recognising then that these conditions are inter-dependent, the chemical analysis of the soil, interpreted in conjunction with the mechanical analysis, gives an indication of the plant food supply therein, deficient or otherwise, and an indication of the particular fertiliser required to be applied to particular crops.

Hall, in his book "The Soil," states:—"In the analysis of soil, without doubt, the most important figure is the proportion of calcium carbonate, for on that must be based the decision, not only whether liming is necessary, but what class of artificial manures should be employed. Where the calcium carbonate is scanty, manures like superphosphate and sulphate of ammonia should never be employed, but basic slag or some neutral phosphate on the one hand, and nitrate of soda as a source of rapidly acting nitrogen on the other. The texture of the soil, the rapidity with which decay and nitrification of organic matter take place, freedom from fungoid diseases, all depend on an adequate proportion of calcium carbonate in the soil, say from ½ to 1 per cent., so that of all the determinations this is the most important."

The application of lime to the soil was practised by the Romans, and since that time to the present, in many countries, has been and is a comomn routine agricultural procedure. The investigations by Agricultural Chemists now show the reason in many cases of the many beneficial effects of an adequate supply of calcium carbonate in the soil.

Queensland Soils.

The analyses of many of the Queensland soils distinctly show a deficiency of lime. A revision of 857 of these analyses was made some years back, and the following figures were obtained:—22.5 per cent. of the soils contained from 0.1 per cent. to 0.24 per cent. lime and 30.5 per cent. contained from 0.25 per cent. to 0.49 per cent. lime.

Research work has been carried out upon a very large scale by the chemist in many countries in connection with the question of soil acidity, and the use of lime as a corrective, an account of this work will be communicated in a paper by Mr. Von Stieglitz, to be read at a later meeting of the Chemical Institute.

Humus derived from decayed organic matter is also a very important soil constituent on account of the very great influence it has upon all soil conditions—chemical, mechanical, and biological. In cultivated land the humus is derived from farmyard manure, green manures, crop and weed residues, which may have been ploughed under. Of particular importance in this State, where somewhat long periods occur at times between rainfalls, is the effect humus has in increasing the soil's power of absorbing and retaining water. And the possibility of the soils organic matter under our hot, dry conditions, being quickly destroyed, must not be forgotten.

Green Manures.

It is now a very well-known fact that the farmer, by ploughing in leguminous crops, which obtain their nitrogen from the air, has the means at his disposal of applying the expensive fertilising ingredient nitrogen to his soil. Green manuring has been practised since ancient times. It is stated the Romans ploughed in their second or third crop of lucerne, but it is at a very much later date that any records are found of investigational work upon the fixation of atmospheric nitrogen by plants.

Boussingault, in 1838, made many laboratory experiments growing seeds of known nitrogen content in *calcined* soil containing no nitrogen, and in other cases the soil was supplied with nitrogenous compounds. Lawes and Gilbert at Rothamsted conducted similar experiments. From the results of these experiments it was concluded that plants were unable to assimilate atmospheric nitrogen. But the field experiments at Rothamsted showed that leguminous crops did accumulate nitrogen to a very large extent. In illustration the following is one of the abovementioned field experiments.

A plot of land, which had been fallowed for five years was analysed and found to contain in the surface 9 in., an average of 2,657 lb. of nitrogen per acre. In the

first year it was sown with barley and clover, the clover being allowed to grow for another two years. The crops harvested and removed from this land during the three years contained 319.5 lb. of nitrogen. Then the soil was again sampled to a depth of 9 in., and upon analysis was found to contain 2,832 lb. of nitrogen per acre. Therefore the soil, notwithstanding the removal of crops, had gained 175 lb. of nitrogen per acre, and this gain, in conjunction with the nitrogen removed in the harvested crops, made a total gain of nearly 500 lb. of nitrogen per acre. As no manure had been used, the question was: From where was this nitrogen obtained? Many similar results from field experiments caused many eminent chemists to investigate this problem. But it was not until 1886, when Hellriegel and Wilfarth made known their researches, that the explanation of this matter was obtained. The conclusion arrived at being that leguminous plants can, by the aid of bacteria, assimilate and fix atmospheric nitrogen.

Green manuring is practised in many of the cultivation systems used in Queensland, but it is thought that the need of maintaining or increasing the humus content of the soils in this State require particular attention. On the subject of humus exhaustion the following paragraph from E. J. Russell's book, "Soil Conditions and Plant Growth," is interesting:—

"The crowding of the population into cities, and the enormous cheapening of transport rates, led during the nineteenth century to the adoption in new countries, particularly in North America, of what is perhaps the most wasteful method of farming known, continuous arable cultivation without periodical spells of leguminous and grass crops. The organic matter was rapidly oxidised away, leaching and erosion increased considerably when the cover of vegetation was removed, while the compound particles, that had been slowly forming through the ages, soon broke down. Nothing was returned to the soil, the grain and other portable products were sold, and the straw burnt. The result has been a rate of exhaustion unparalleled in older countries, and wholly beyond the farmers' power to remedy, consequently he left the land and moved on. The excellent experimental studies of Hopkins at the Illinois Experimental Station, of Whitson at Winconsin, and other American investigators have shown that addition of lime, of phosphate, and sometimes of potassium salts, with the introduction of rotations, including grass and leguminous crops and proper cultivation, will slowly bring about a very marked improvement."

Fertility of Queensland Arable Areas.

Judging from the analyses that have been made of Queensland soils, and from crop results from suitable crops grown upon these soils, it is evident there are some very fertile tracts of country in the State. But the chemical analyses also show that many of our soils have a low phosphoric acid content. This deficiency in phosphoric acid has been noted in a number of soils in other States of the Commonwealth. Again, the analyses of some of the red soils indicate that they contain a good total amount of phosphoric acid, but that the percentage of phosphoric acid that is considered readily available to crops is low, and also that these soils have not a high potash content, but their percentage of available potash is high. Such knowledge of a particular soil type is very valuable and the correct economical application of fertilisers to different crops is determinable. For this reason soil survey work is important, for when the characteristics of a soil type, the results of crop growth and the results of manurial and cultural trials upon that type in any locality are known, information can at once be given in connection with any soil of that type which is forwarded for analysis on account of unsatisfactory crop results.

Artificial Fertilisers.

Although it is essential to always aid the maintenance of a soil's fertility by approved methods of cultivation, it has been found, under modern agricultural conditions, that the addition of artificial fertilisers is also necessary to maintain or increase the soil's capability of economical crop production. Of course, it is to be understood that the application of any farmyard manure whenever obtainable should never be neglected, though it is thought such neglect is far too common, and that in cases where farmyard manure is scarce, the organic matter in the soil must be maintained by green manuring. When the fertilser industry is considered, it will be seen that its development has been dependent upon the research work of the chemist.

Records published about 1653 mention the value of the application of wool, bones, horn shavings, soot, wood-ashes, blood, &c., but the first recognition that the phosphoric acid content of bones was one reason for their value as fertiliser seems to have been made by Lord Dundonald in his "Treatise on the connection of Agriculture with Chemistry," published in 1795.

In 1840 Liebig published a record concerning the treatment of bones with sulphuric acid.

Lawes also treated bones with sulphuric acid, the resulting material, superphosphate, was obtained in which the phosphoric acid exists in a water soluble condition. In 1842 he took out a patent for this process, and with the discovery of mineral phosphate desposits, superphosphate has become a very commonly used phosphatic fertiliser.

An action for infringement of Lawes's patent was taken, and the evidence shows that he had used superphosphate experimentally before Liebig's publication.

Another interesting phosphatic fertiliser is basic slag, or Thomas's phosphate. In 1878 Thomas and Gilchrist made a modification of the Bessemer steel-making process, in order to effect the removal of phosphoric acid from the pig iron. This modification consists in making the lining of the furnace with basic material where formerly it had been siliceous, and adding lime to the molten pig iron. The phosphoric acid in the pig iron combines with the lime and is run off as a slag. The material obtained from the calcium phosphate deposits in different parts of the world, after grinding, is now also applied as a phosphatic fertiliser.

In connection with nitrogenous fertilisers it will be remembered that Sir William Crookes in 1898 drew attention to the ultimate exhaustion of the world's sodium nitrate deposit, and suggested the future supplies of combined nitrogen would be derived from the combination of nitrogen with oxygen, and also suggested how this could be effected by electricity cheaply generated. Since then the economical combination of atmospheric nitrogen has been accomplished, with the result that the nitrogenous fertilisers—calcium cyanamide or nitrolim, and nitrate of lime—are now upon the world's market.

Recognising that a sufficiency of all the plant foods is necessary for plant growth, then, when considering the particular effect of nitrogen, phosphoric acid, and potash upon plant growth, it may be stated generally that nitrogen promotes the growth of the foliage of the plant, that potash effects the production of carbohydrates, and that phosphoric acid induces root growth and influences the production of seed and fruit.

Cotton Crops—Fertiliser Trials.

The Agricultural Chemist, Mr. J. C. Brünnich, in his Annual Report for 1924, makes mention of the excessive vegetative growth, with practically no boll production in some of the cotton crops grown on soils with high humus and nitrogen content, with fair to high amounts of potash, but with rather deficient amounts of lime and low amounts of available phosphoric acid, and states:—

"In many of our cotton fields experiments must be made to find out if phosphatic manure alone, or aided by addition of lime, will produce better crops, as cotton is recognised as one of the lime-loving plants."

It has been shown by many trials that crops well supplied with potash are very much more resistant to disease attacks than are crops not so well supplied.

The statement has been noticed in a nurseryman's catalogue that the application of potash has been beneficial to rose trees in so far as mildew is concerned, but of interest in so far as this paper is concerned are the many extracts from scientific publications in reference to the effect potash has upon plant growth.

Fodder Crops.

Considering now some products of the soil, very extensive chemical examination has been made in connection with fodders and feeding stuffs. The usual analysis of foodstuffs determines the following constituents:—Moisture, protein, fat, carbohydrate, fibre, and ash, and the function of these constituents in the animal body is known. In other countries a very large number of experiments upon the digestibility of different foodstuffs have been conducted, but as far as it is known the only experiments in Australia of this nature were conducted by Professor Perkin, who experimented with horses, and by Brünnich and Rawson, who experimented with sheep. The results of the last-mentioned experiments were published in a paper, "Digestibility of Fodders," read before a meeting of the Australasian Association for the Advancement of Science, in Melbourne, 1921.

Such experiments upon the digestibility of fodders should be conducted in Australia as, owing to a difference in climate, soil, and growth of crops, it is possible somewhat different digestion co-efficients would be observed. Knowing the amount digestible of the different constituents of the different foodstuffs is only the first step towards a knowledge of the relative value of these foodstuffs, for the different constituents therein are not all of the same food value. But now resulting from the large amount of scientific investigation upon this subject, the evaluation of these different food constituents under one standard—viz., starch equivalence—has

been established. When this method is used for comparing different foodstuffs, the fat-producing power of the different constituents is estimated and also recognition is made of the loss of energy in mastication and digestion of the foodstuffs under consideration.

Analyses of all the commonly used foodstuffs, as well as a number of the grasses growing in our pastures, have been published. Standard rations for the feeding of animals for definite purposes have also been published.

Therefore, the feeder has the information necessary for him to compound from the foodstuffs in current use in his district a ration, giving the same feed value required by the particular ration he desires to use. Or in times of scarcity or high prices of the foodstuffs he has been accustomed to use, he can decide which is the cheapest and most suitable feed to be used in place of them.

Again, when the foodstuffs are grown by the farmer he can decide the quantities of the crops to be grown to meet the requirements of the particular ration desired. That economical efficient feeding of stock means increased wealth to the community is a fact of such importance that it should never be under-estimated, and should be more generally recognised.

Lime Deficiency in Soils.

As previously mentioned, the analyses of a number of our soils show a deficiency in lime and phosphoric acid, this deficiency is evidenced also by the bone-chewing habit acquired by cattle feeding on the pasture grown on such soils. Many pastoralists have been forced by reason of this deficiency of mineral matter in the pasture eaten by their stock to supplement this deficiency by means of cattle licks. In connection with this subject a valuable and interesting paper was read at the 1921 meeting of the Australasian Association for the Advancement of Science, by E. Murphy, Dairy Supervisor, Victoria, entitled "The Health of Live Stock. Notes on soils and pastures." Many interesting facts and suggestions are mentioned in this paper, of which the following are quoted:—

"I do not underrate the baneful effects of over-stocking, but wish to stress the fact that the killing out of the deep-rooting grasses throws the burden of stock carrying upon the superficial layers of the soil, which quickly become depleted."

Again, in the above paper, mention is made of a farm which forty-five years ago was free from disease and that then the surrounding district was covered with white clover, and that there is now no white clover to be found, and the farm in question has become very unhealthy.

"Heavy losses have occurred on this farm and throughout the district from cripples and paralysis in cows and in sheep, &c."

"The Department of Agriculture conducted some manurial trials on portion of the dairy farm mentioned above. Lime and superphosphate gave the best results. Ten hundredweight of lime and 2 cwt. of superphosphate were applied per acre in 1918 and again in 1919. Samples of the manured and unmanured vegetation were analysed. The results throw a flood of light upon the necessity for maintaining an adequate supply of mineral nutrients in the pasturage for lactating animals. On the food supply grown on the manured land the animals thrive, on the other they die.

CHEMIST'S REPORT.

	No. 1. Area untreated. Per cent.	No. 2. Area treated with lime and super. Per cent.
Total ash	7.19	7.17
Protein	5.55	10.25
Crude fibre	32.37	28.36
Carbohydrate	52.21	51.37
Fat	2.68	2.85

Analysis of the Ash.

	No. 1.	No. 2.
Phosphoric acid	0.14	0.33
Potash	0.84	1.70
Lime	0.42	1.06
Magnesia	0.18	0.27"

In an article appearing in the "Queensland Agricultural Journal," May, 1923, entitled "Impaction Paralysis of Cattle in Queensland," by John Legg, Government Veterinary Surgeon, Townsville, attention is called to a disease occurring in certain areas in North Queensland, which disease the author considers "similar to the condition known as impaction paralysis in Victoria."

It is mentioned that one selector estimates his losses at over 500 head in the last five years. The following is quoted from this paper:—"A further comparison between the two diseases will show that in Queensland as well as in other parts, the disease occurs mostly on poor country, *and where the bone-chewing habit is common among cattle.*"

In Queensland, graziers have stated that although some country looks good sheep country, when sheep are put upon this land they do very badly when compared with sheep upon other country, and information and advice has been asked for in connection with this matter.

The following extracts have been taken from the report of the Queensland Agricultural Chemist dealing with this subject:—

"The three most important elements necessary to sheep are potash, phosphoric acid, and lime, and the two latter are very deficient in many localities. Lime itself is liable to very rapid exhaustion, being washed out by heavy rainfalls.

"The composition of a few soils given below from different localities will speak for itself, and will account for the difference in value of these places for sheep breeding.

	Lime. Per cent.	Phosphoric Acid. Per cent.	Potash. Per cent.
Comet Downs ..	0.23	0.05	0.17
Emerald	0.20 to 1.30	0.04 to 0.10	0.20 to 0.40
Longreach ..	1.2	0.10	0.30
Blackall, Isis Downs	4.00	0.10	0.46
Peak Downs ..	4.40	0.40	0.40
Barcaldine ..	0.08 to 1.00	0.02 to 0.04	0.14 to 0.27

&c., &c. Phosphoric acid, the want of which, I think, is in many cases more pronounced than the want of lime, can only be supplied in the form of lick, and indirectly by using phosphatic fertilsers as top dressing of the grasslands, which is unquestionably the best method wherever practicable. Closer settlement, by cutting up large areas into suitable sizes for mixed farming will make better use of some of the runs at present not eminently suitable for the exclusive raising of sheep."

Need for Chemical Investigation.

All the preceding matter in connection with the ill effects of feeding pasturage deficient in mineral constituents illustrates the need there is for the chemical investigation of our pasture lands and vegetation.

Time will allow only of the mention of the fact that the chemical investigation of milk and its products has been a large factor in the progress of modern dairying. But it is desired to refer to the great benefit the dairy farmer has received from the evolution of quick methods for the determination of fat in milk and cream. The Babcock method was invented in 1890 by Dr. S. Babcock, Chemist of the Wisconsin Experiment Station, and this method enables the quick and easy testing of the fat content in the milk of the individual cow—thus permitting of the culling of the non-paying or less valuable animals from the herd.

It is recognised that the higher the standard of quality of agricultural products the greater is the value obtained by both the agriculturist and the State; for this reason standards for some of these products have been proclaimed by Acts of Parliament.

In a similar manner standards have been proclaimed for many of the commodities used by the agriculturist. It is within the province of agricultural chemistry to determine if the abovementioned standards are obtained, which necessitates the analysis of dairy and other agricultural products, fertilisers, insecticides, stock foods, &c.

In this paper a very brief description of the manner in which agricultural chemistry can be of benefit to agriculturists in connection with soil management, fertilisers, crops, and the feeding of stock has been given, and it is hoped the value of agricultural chemistry to the primary producers of this State has to some little extent been illustrated.

THE POULTRY TICK.

By P. RUMBALL, Poultry Instructor.

Poultry keeping, which is one of the most valuable adjuncts to general farming, is frequently severely handicapped in many parts of Queensland by the presence of the Poultry Tick (*Argas persicus*). Very little good would be done in trying to explain how this pest was introduced. It is here and has gradually spread over a large expanse of country. In many of the infested areas it is not uncommon to meet farmers who have had their flocks almost depleted, and others who have disposed of their one-time profitable flocks on account of the ravages of this pest. A knowledge of the general habit of the tick, precautions necessary to take against its introduction, and methods of eradication are the means by which poultry may be kept successfully.

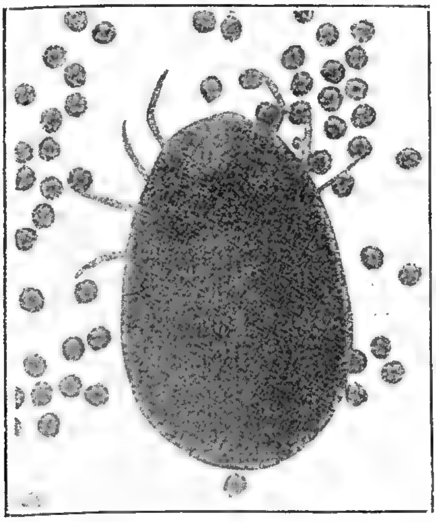
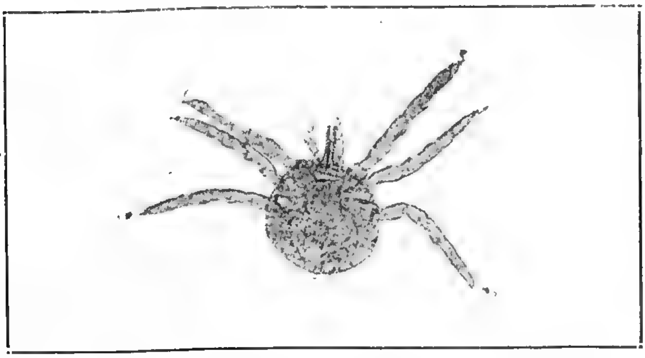


PLATE 29 (Fig. 1).—POULTRY TICK AND EGGS.



Bulletin No. 74, South Australia.]

PLATE 30 (Fig. 2).

Hosts.

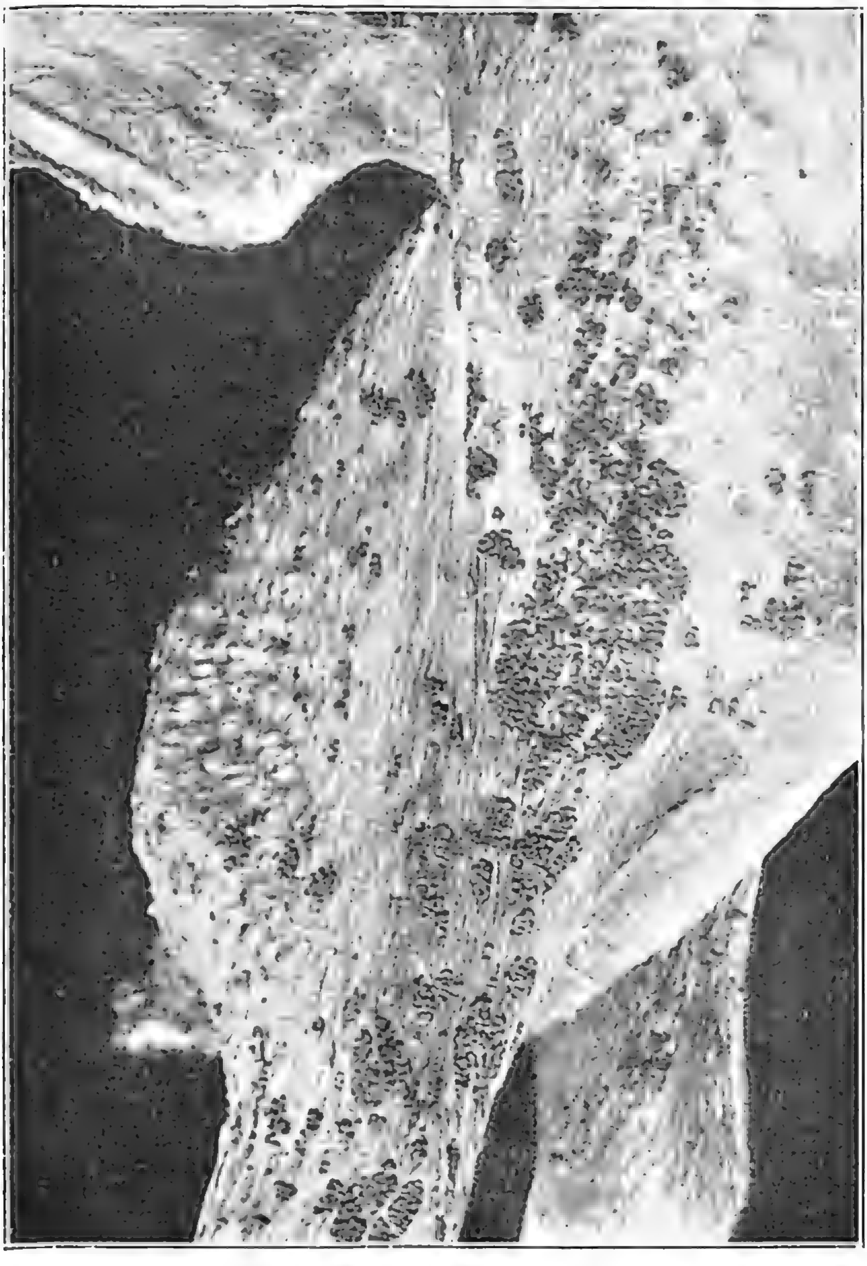
Fowls appear to be preferred as hosts by the tick, although turkeys, ducks, geese, and pigeons are also attacked. This preference is probably due to the more restful and regular habits of fowls at night than that of other kinds of poultry. Wild birds are also known to harbour ticks. Such infestation has come, no doubt, by the close association with infested poultry yards.

Life and Habits.

The egg of the tick, as shown in Fig. 1, is very small and is of a brownish colour. It is found in the crevices of the wood work of the houses, perches, and some-

times adhering to feathers, &c. This egg hatches in the course of two to three weeks. Nuttall states the period at from eleven to thirteen days, but probably in cold weather the period is considerably longer.

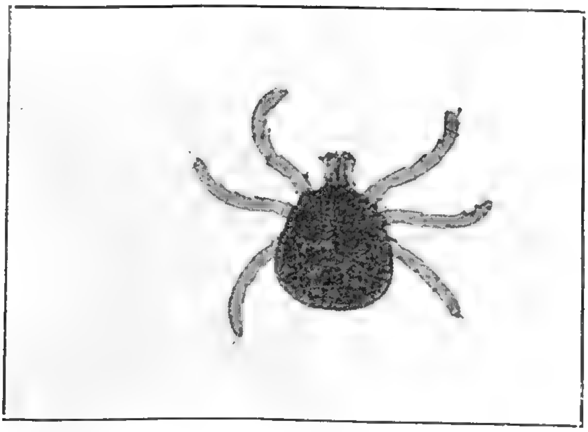
The young or seed tick, as shown in Fig. 2, has only six legs, white or greyish in colour and very difficult to see. As soon as their covering has hardened they make their way to a host, generally by crawling up the legs of the birds, and attach themselves as shown in Fig. 3. They remain here for a period varying from four to ten days, swelling considerably and appear as bluish-black spots on the body of the bird.



Bulletin No. 71, South Australia.]

PLATE 31 Fig. 3).

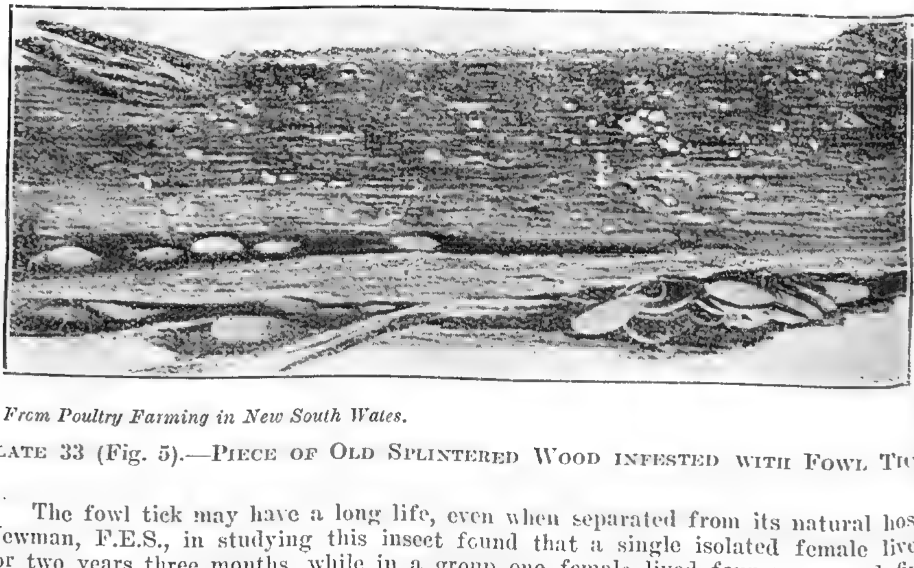
Fig. 4 shows a young seed tick which has fed and left its host. It has altered considerably in appearance. This seed tick then seeks some secluded spot to rest and moult.



Bulletin No. 74, South Australia.]

PLATE 32 (Fig. 4).—A YOUNG TICK WHICH HAS FED AND LEFT ITS HOST.

Fig. 5 shows an ideal home for the tick. They will also be found under the bark of trees, cracks in perches, and any similar spot which offers concealment. In searching for the tick one is guided by the darkish spots around cracks in the woodwork of the buildings. These spots are caused by the excreta of the tick. The moulting period takes four to nine days. After moulting the tick presents a somewhat different appearance, having eight legs. It now only feeds at night. The meal is taken rapidly, and long before daylight it is safely hidden away in its retreat. This process is repeated (usually three times) until matured. The adults vary considerably in size, large ones being nearly half an inch in length. After another feed the adult female is ready to lay. The poultry tick varies in this respect to the ordinary tick, as she may lay as many as eight batches of eggs of 20 to 100 before death.



From Poultry Farming in New South Wales.

PLATE 33 (Fig. 5).—PIECE OF OLD SPLINTERED WOOD INFESTED WITH FOWL TICK.

The fowl tick may have a long life, even when separated from its natural host. Newman, F.E.S., in studying this insect found that a single isolated female lived for two years three months, while in a group one female lived four years and five months. The males were comparatively short-lived. I have found ticks thriving in poultry sheds in Queensland where fowls have not been kept for nearly two years. It will, therefore, be seen how impractical it is to merely shut up a fowl house for a year or so with the hope of extermination by starvation.

Effect on Poultry.

From the foregoing, it will be seen that during the day the adult tick is under cover, principally in the roosting quarters, cracks in the timber, nest boxes, old bags, or even between sheets of galvanised iron where it overlaps, and the young or seed tick is attached to the fowl. Its effect on fowls is not confined to the loss of blood. The most serious trouble is caused by the transmission of an actual blood parasite. This parasite induces a fever which either causes the fowl to die or leaves it after a severe illness to recover and become immune to further attacks. This immunity frequently leads farmers to under-estimate the havoc that can be wrought by the poultry tick, and they become indifferent to their presence.

The symptoms of fowls suffering from tick fever are rise in temperature, listlessness, frequently a loss of appetite, restlessness and distress, ruffled plumage, blackness and shrinkage of comb, and some symptoms of paralysis. Diarrhœa is nearly always present, and owners frequently conclude that their birds are suffering from cholera. When these symptoms present themselves, a thorough search should be made for tick.

Combative Measures.

Prevention of infestation should be the aim of poultry keepers who are free of tick. Strict examination and isolation for a period of ten days of all stock purchased assures that when the new birds are placed among the flock they carry no seed tick with them. Burning or spraying will deal with the isolation crate. All crates, egg boxes, or material brought on to the poultry section should be subject to the same rigid examination. Particular care should be given to the examination of crates returned from market, as it is possible that in transit ticks may travel in search of a host from infested crates to clean ones.

The fact that a very little portion of the life of the tick is spent on the fowl while the infestation of the houses may last for years, naturally causes one to direct his efforts to the treatment of the sleeping quarters of the stock.

Many flocks have no shelter other than trees, and the proper treatment of these is almost impossible. Some of the poultry sheds used are also impossible to treat, every piece of timber being a natural home. Good housing accommodation therefore facilitates eradication. Where the trees and existing infested houses are of no value, a fire is the most economical and effective method of treatment. If the trees are valued for shade purposes they can be securely fenced off and the fowls induced to sleep in the quarters provided.

A start should be made in dealing with infested houses by carefully removing any surplus boxes, boards, and other harbourage, and if of little value make a bonfire of them. When the house is thoroughly cleared of rubbish, spray the entire inside, taking care to get into every crack and crevice, also between the iron where it overlaps. Thoroughly treat all fittings in a similar way, and in case any ticks have been dislodged and are lying on the floor, give that a spray as well.

The number of sprayings necessary is largely dependent upon the construction of the buildings, and the thoroughness with which the work is done, but three sprayings should always be given at intervals of about five days. These subsequent sprayings will kill any seed ticks that may drop off infested stock from time to time. Where the stock have been accustomed to roost on various parts of the farm it would be well to keep a look-out for the reappearance of the tick for some years, as certain birds laying or roosting away may collect ticks and bring them home to the regular quarters.

Spraying Mixture.

Various spraying mixtures have been tried from time to time, but probably the handiest and one that is very efficient is kerosene emulsion made in the following way:—Take 1 gallon of water, boil in it 1 lb. of good household soap; while hot add 1 gallon of kerosene, stir well until thorough emulsified, then add another 3 gallons of water. Use this mixture freely, for it is both cheap and effective.

POULTRY FEEDING.

By P. RUMBALL, Poultry Instructor.

To assist in the utilisation of the various foods produced on the farm and to enable the feeder to select those which contain the materials necessary for all the body functions, together with egg production and table requirements, a knowledge of food constituents and their uses is necessary.

In a general analysis foodstuffs are classified as moisture, proteins, carbohydrates, fats and oils, fibre and ash. This analysis can only be taken as a rough guide, as the quality of foods vary in seasons and localities, but it enables the feeder to work upon more or less definite lines.

Experience has taught us that a balanced ration, that is a mixture of foodstuffs having a certain proportion of protein and a certain proportion of carbohydrates, is

necessary to obtain maximum results and that this ration should vary. Variety not only assists us in the correct balancing of food, but adds to the palatability of the ration, stimulates the secretory glands and in many ways helps digestion and assimilation.

This nutritive ratio has been set by some authorities on feeding as 1 part of protein to 5 parts of carbohydrates, but with poultry, although this ration is suited to the more severe winter months, it needs to be narrowed in the summer, and over a period of twelve months a ration of 1 to 4½ has proved most suitable. In its preparation a variety of foods should be used.

The value of foodstuffs depends largely upon their digestibility, and although results of experiments, if any, in this direction are not available in connection with poultry the feeder may base his calculation on the following table of digestible nutrients in a few of the most suited poultry foods.

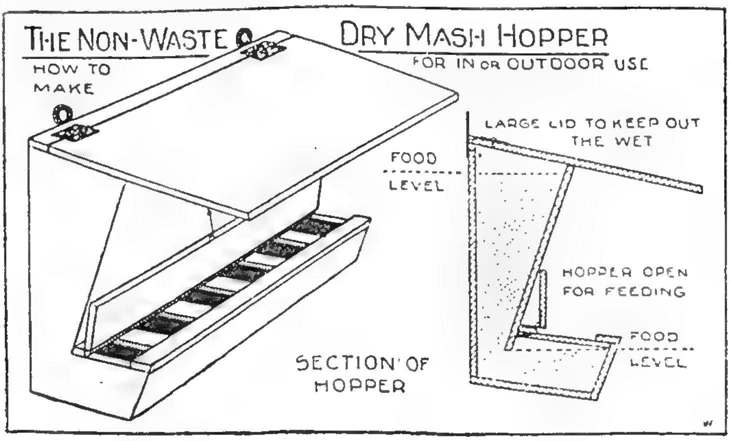
COMPOSITION OF SOME POULTRY FOODS.

Digestible Nutrients.

—	True Protein.	Carbohydrate.	Fibre.	Fat.	Nutritious Ratio.
Barley, Green	1·2	9·0	2·9	0·4	1 to 10·7
Lucerne, Green	3·0	6·1	3·4	0·3	1 to 3·4
Pumpkins	1·1	7·0	2·6	0·7	1 to 10·2
Dry Lucerne Chaff or Meal	11·1	21·7	11·9	1·4	1 to 3·3
Barley	8·7	64·2	0·7	1·2	1 to 7·8
Maize	10·0	61·2	1·2	4·7	1 to 7·3
Cowpeas	17·3	52·0	1·1	0·8	1 to 3·2
Wheat	11·8	54·0	1·1	1·5	1 to 5·0
Feterita	10·1	65·4	..	2·4	1 to 7·0
Oats, Hulled	11·4	57·7	..	7·5	1 to 6·5
Bran	11·0	34·5	1·6	1·8	1 to 3·6
Pollard	13·9	47·0	1·7	4·8	1 to 4·3
Peanut Meal	33·8	11·6	0·6	7·2	1 to 9·0
Oil Cake (Sunlight)	15·6	38·6	4·0	10·4	1 to 4·3
Bone Meal, Fresh	18·3	..	..	24·5	1 to 3·0
Meat Meal	54·3	..	..	10·55	1 to 0·½
Buttermilk	3·4	4·9	..	0·1	1 to 1·5
,, Dry	29·3	41·0	..	6·2	1 to 1·9
Milk, Skim	3·6	5·2	..	0·1	1 to 5·0
Blood, Dry	52·4	..	..	2·5	1 to 0·1

Moisture.—Moisture embraces the amount of water in various foods, and even in their driest forms it is always present. Water, although highly essential for both growing and adult stock and a liberal supply is always necessary, is of no value in foods, and according to the quantity present so is the value of the food generally lessened.

Protein.—Protein includes all organic, nitrogenous substances. It is essential for the flesh-forming purposes of growing animals, and the building up of waste tissues which is one of the consequences of active existence, and poultry being very active naturally require a relatively higher percentage of protein food than other live stock. It is also necessary for high egg yield. Foods rich in protein are all forms of animal foods, peas and beans. Hard flinty wheats carry a higher percentage than soft starchy grains. Yellow maize also carries a higher percentage than the majority of the white varieties.



Carbohydrates.—Included in this category are the starches and the sugars. Their principal functions are the production of heat and energy and the formation of body fats.

Fats.—Fats are essentially heat and energy producing, and incidentally assist the building up of the body fats.

Fibre.—Fibres include the least digestible of foods, such as the outer cells of grains and the fibrous matter in plants.

Ash.—This is the residue of burnt foods and represents the mineral matter drawn from the soil by plant life. As a general rule stock that has free range and live on herbage obtain sufficient quantities of mineral matter, but with poultry, more especially those confined, the absence of mineral matter in their food has frequently been noticed. This is due to the fact that the ash content of the grain is generally less than that of the whole plant. Liberal supplies of green feed, especially green lucerne, and, failing green lucerne, lucerne meal or lucerne dust, will largely make good this deficiency. Skim milk is also another excellent food by which the mineral contents of food may be augmented. In compounding a ration we must naturally give consideration to the utilisation of foods locally grown, and even though they may not give the maximum results they may prove economically sound on account of the very much reduced cost of feeding.

The Food Ratio.—To enable readers to test for themselves the ratio of the foods they are using, those consumed by the birds during the last Mount Gravatt competition is given as an illustration. The first column shows the total weight in pounds of food, the second the total protein content, the third the carbohydrates, and the fourth fats and oils. The cost of the various foods used is given also.

To obtain the content of the various constituents the weight of the food is multiplied by the percentage shown in the table of analysis. The total protein content is then divided into the totals of the carbohydrates and fats, after the latter have been multiplied by 2.25 to show their carbohydrate equivalent, as a pound of fat will create as much energy as 2.25 lb. of carbohydrates.

Although the ration used in this test was slightly narrow or carried rather too much protein good results were obtained, owing to the exercise promoted by feeding grain in litter. In the present test slightly more maize is being used and is giving equal if not better results, and incidentally reducing the cost of feeding.

TABLE OF FOOD CONSUMED BY 270 BIRDS, MOUNT GRAVATT COMPETITION, 1924-5.

Kind of Food.	Weight in Lb.	Protein.	Carbohydrates.	Oils and Fats.	Cost.
Wheat	9,114	1,075·45	4,921·56	136·71	47 18 7
Maize	5,382	538·20	3,293·78	254·95	18 3 1
Bran	3,390	372·90	152·55	61·02	12 19 2
Pollard	8,760	1,217·00	4,117·20	420·48	36 14 11
Lucerne Meal ..	1,202	133·42	152·65	16·82	7 9 2
Linseed Meal ..	75	22·50	21·15	2·40	0 9 3
Meat Meal	900	342·00	..	72·00	9 19 3
Charcoal	7 bags	..	..	..	2 1 0
Shell Grit	1,680 lb.	..	..	..	6 13 2
Salt	20 lb.	..	..	..	0 4 2
		3,702·17	12,658·89	965·35	142 11 9

Ratio = 965 (fats) x 2·25 + 12658 (carbohydrates) ÷ 3702 (protein) = 1 to 4.

NOTE.—The meat meal used was low in protein and contained salt, which accounts for the small quantity used. Average cost of feed per bird, 10s. 6·7d. Average number of eggs laid, 204 per bird.

Quantities.—It is not desirable to lay down definite quantities for the feeding of poultry. Growth and egg production can only be maintained when the quantities supplied are in excess of that required to support life, and it is a good maxim to feed to stock all that they will consume. In certain experiments carried out at the New York Experimental Station it was ascertained that it took 3.9 lb. of digestible dry matter to maintain in good health 100 lb. of live poultry weighing 3 to 5 lb., while those in full lay require 5.5 lb. This illustrates the necessity for liberal feeding to laying birds, and the same remarks apply equally as well to

growing stock. Experience has shown us that a ration consisting of 1 part protein to 4.5 parts carbohydrates gives satisfactory results as an egg producer, while the ration for the growing chicken should be a trifle narrower, and that for fattening a fowl which is nearly mature considerably wider.

Grain Feeding.

It is futile to expect good results from grain feeding alone, for it will be seen from their analysis that they are more or less deficient in protein. There are, however, times when a good egg yield is obtained from birds fed on grain only, but this is generally in the spring months, when fowls at liberty obtain food rich in protein, in the form of insect life. Grains are by no means depreciated as a poultry food, and Queensland's staple grain, maize, is worthy of notice. Maize is generally procurable at reasonable prices and, although as yet not extensively used by commercial poultry farmers, it is coming more into favour. It is deficient in protein and fairly rich in fats and has a tendency to lay on internal fat, but when used in conjunction with other nitrogenous foods this difficulty is largely overcome. One third of the grain used in the last egg laying test consisted of maize; the laying was excellent and the general health of the stock all that could be desired. Breeders who are using maize more extensively also report in its favour. Apart from its feeding value it materially assists in giving that rich orange colour to the yolk of the egg.

Feterita, one of the grain sorghum family, should also be of value to the poultry industry. It is a prolific cropper and resistant to drought, two features which should permit of its being produced at prices that would encourage its use as a poultry food. Poultry consume it readily, and breeders who are using it speak in its favour, even though the percentage of carbohydrates are high.

Feeding of Laying Stock.

There are two methods of feeding in common use, wet mash and grain and dry mash and grain, good results being obtained by both. Liberal quantities of green feed are given in each method. It is a difficult matter to say which is the better of the two, but to the general poultry keeper, more especially the man with little time and the novice, I recommend the use of dry mash. By this system a considerable saving in labour is made and the birds get a full supply of what should be a well balanced ration. It is impossible for the birds to swallow mash dry; therefore it should stimulate the secretion of saliva and aid digestion.

Wet mash feeding, however, has its advantages, in so far that large quantities of succulent green feed can be used and, where available, the mash can be mixed with milk; the feeder needs to be particularly careful to see that his birds have full and plenty, but should not leave food lying around to become fouled and sour.

Suitable mash mixture—Bran, 25 per cent.; pollard, 55 per cent.; lucerne meal or dust, 12 per cent.; meat meal, 5 to 10 per cent.; salt, 12 oz. to every 100 lb. of dry feed.

This mixture is that which was used in the egg-laying competition at Mount Gravatt, and it gave good results with a mixture of wheat and maize at night. The feed used throughout the whole test of twelve months had a nutritive ratio of 1 part protein to 4 parts carbohydrates. If dry mash is being fed this mixture can be mixed in bulk and fed in gravitating hoppers to guard against waste. If it is desired to feed wet mash, the lucerne dust or meal may be replaced with green feed and may be increased to 25 per cent. of the bulk, or in droughty time when feed is dear more green stuff may be used. When liberal supplies of milk are available the addition of meat meal is not necessary. Shell-forming material, such as shell grit and charcoal, should always be available, and the general health of the stock provided for by promoting exercise by feeding the grain in litter.

CHEESE BOARD.

The following nominations for election as producers' representatives on the Cheese Board have been received:—Henry Keefer, Pittsworth; Mads Peter Hansen, Maclagan; David Gabriel O'Shea, Southbrook; Henry Thomas Anderson, Biddeston; Thomas Dare, Narko, Cooyar Line; Albert George Tilley, Rosehill; and William Smith, Yangan. Five representatives only are required.

LIME.

By J. C. BRUNNICH, Chemist, Department of Agriculture and Stock.

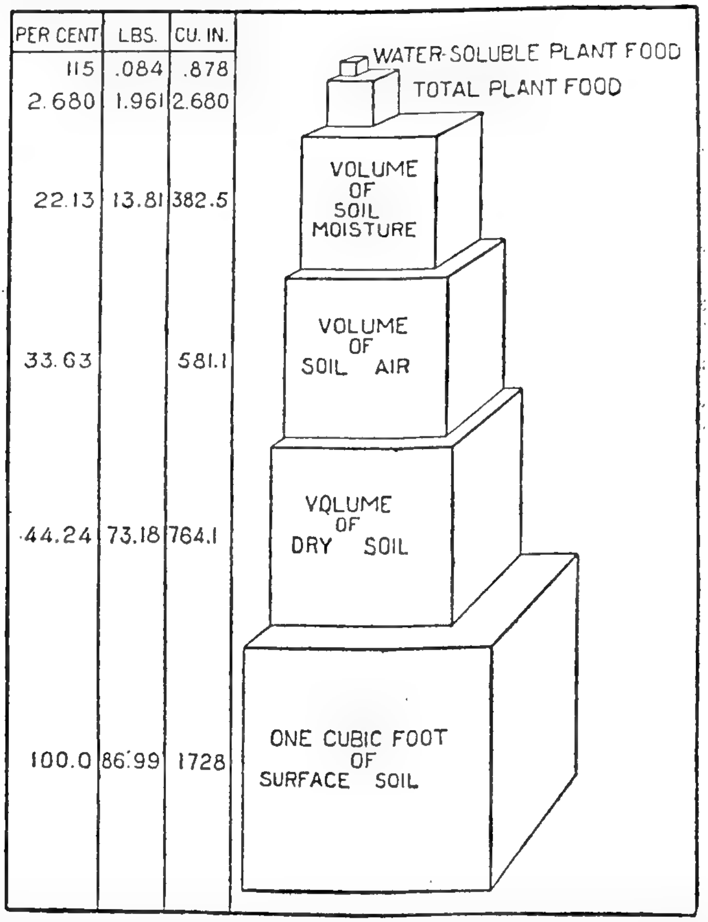
The late Director of the celebrated Rothamsted Experiment Station, Sir A. D. Hall, stated in his opening address of the meeting of the British Association for the Advancement of Science, held in Australia in 1914, as follows:—

"Of all soil factors making for fertility I should put lime the first. Upon its presence depend both the processes which produce available plant foods in quantities adequate for crop-production at a high level and those which naturally regenerate and maintain the resources of the soil. It is, moreover, the factor which is most easily under the control of the agriculturist."

Before, however, entering on the discussion of lime and its functions, a few remarks on soil management in general must be made, in order to understand the importance of these functions.

In order to establish, increase, and maintain the productivity of any soil, a careful management of the soil is required, and such management must be based, according to the late Professor F. H. King, on the following fundamental principles:—

1. The necessity for a *sufficient amount of room in the soil,* not only in the portion turned with the plough, but throughout the effective root zone.
2. The existence in the soil of *large amounts of plant food materials,* but not in available form, and which it must become the business of soil management to transform into available condition with sufficient rapidity to meet the need of a heavy crop.
3. The necessity of an *ample crumb-structure* of the soil throughout the effective root zone, which bad management breaks down and which good management builds up and renders more stable.



This Plate I. illustrates the different volumes of the component parts of a cubic foot of surface soil of average quality.

* This Plate and the following are taken from the late Prof. King's book, "Soil Management."

We are apt to look upon soil as a dead inert mass, but this view is entirely wrong, as each pinch of soil contains millions of living organisms, and is really a world of its own. The *internal surface of the soil* grains is the pasturage where all the micro-organisms grow and multiply, and where plant foods are made available and stored. Plenty of room within the soil is required for this world of life, where water is stored, air penetrates, the rootlets of plants develop, grow and feed, and finally decay.

In a fertile soil an abundant amount of all necessary plant foods must be present, and the absence of a single one would make the soil sterile; only a comparatively small amount need to exist in readily available form.

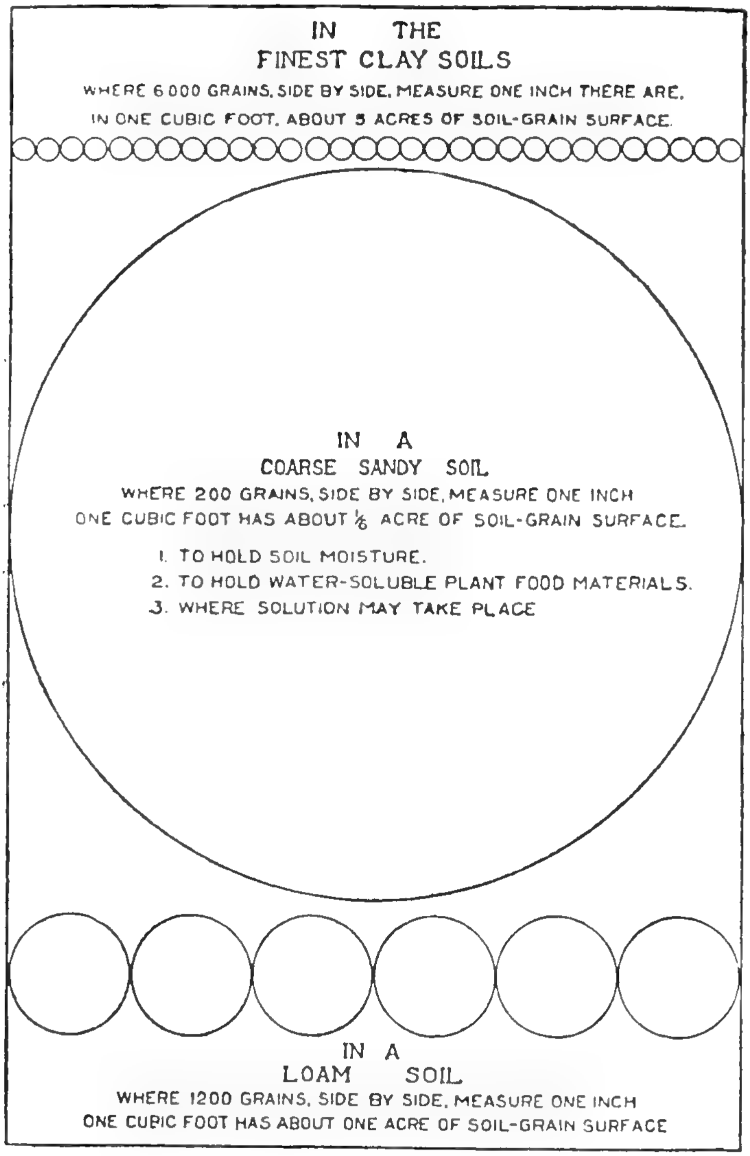


Plate II. shows the relative size of the various soil particles in loam and sandy soil.

An acre of soil, to a depth of 12 in., weighs on an average 3,500,000 lb., or 1,565 tons, and should contain about the following amounts of the essential plant foods:—

K_2O Potash.	CaO Lime.	MgO Magnesia,	N Nitrogen.	P_2O_5 Phosphoric acid.	SO_3 Sulphuric acid.
Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
20	9	7	4	2½	½

As the effective root zone in a well-drained soil reaches to a depth of 3 to 4 ft., a very much larger amount of plant foods than stated above are really available. The great bulk of these plant foods is in an insoluble form and therefore not readily leached out by rain, but small amounts are soluble in water, and further amounts are continually liberated by the activity of the living organisms, decay of vegetable organic matter, the interaction of various chemical constituents, the action of the fine rootlets, &c., and these liberated available plant foods are dissolved and stored in the thin film of water covering the soil particles.

The internal surface of a soil is therefore of the greatest importance, and becomes greater as the size of the particles becomes smaller.

A marble 1 in. in diameter, which just fits into a cubic inch of space, would have a surface of 3 1/7 square inch, the cube a surface of 6 square inches. Decreasing the size we get—

with 1/10 in. diam.	1,000 in a cub. inch, with	31.4	sq. in. surface
with 1/100 in. diam.	1,000,000 in a cub. inch, with	314	sq. in. surface
with 1/1000 in. diam.	1,000,000,000 in a cub. inch, with	3141	sq. in. surface

In a good soil there are from 40 to 80 per cent. of the particles smaller than one-thousandths of an inch, and therefore we get in an acre foot of soil, the surface of the soil granules amounting to: from 10 to 300 square miles.

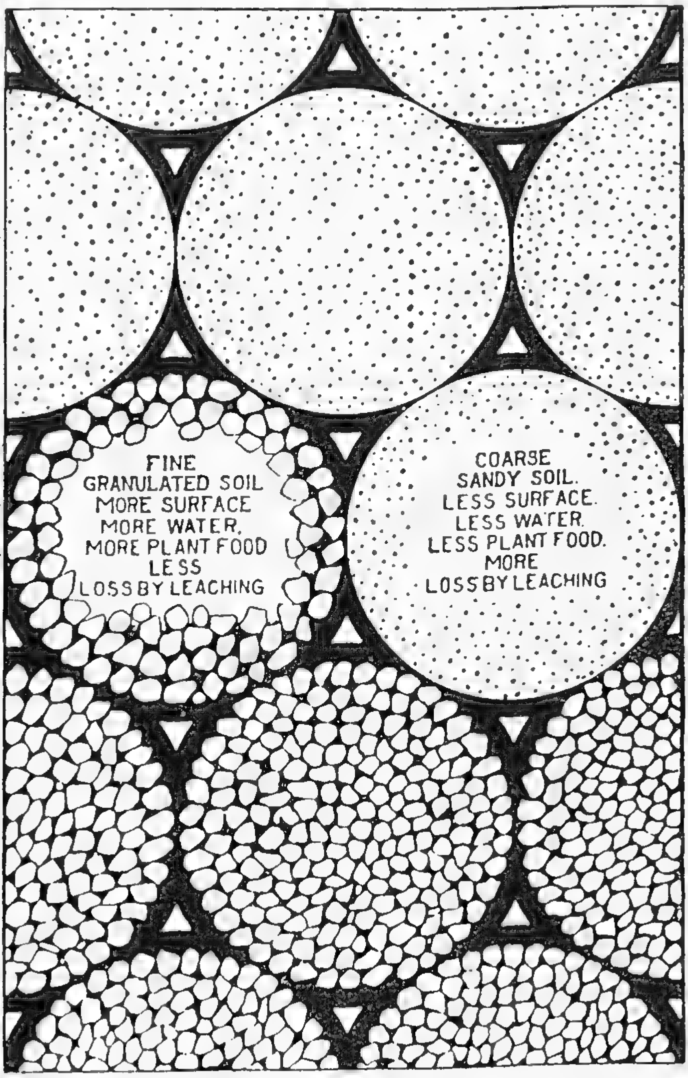


Plate III.

The most important physical condition of a soil *is its tilth,* which means a thorough deep and strong granulation, which produces the crumb-structure, without which there would be imperfect drainage, poor ventilation, and lack of room for the proper development of plant root and rootlets, and for the multitude of soil organisms, whose activity is absolutely indispensable for the maintainance of soil fertility.

The finest soil particles are so small, that if they were not bunched together they would be like heavy potter's clay, practically impervious to air and water. By proper soil management a proper tilth is obtained, which causes the fine particles to form such crumbs, and in this respect lime plays a most important part. Each such crumb of soil becomes like a sponge, and is full of water charged with available plant foods ready to be sucked up by the plant rootlets. Plate III. shows the soil granules of a loamy soil compared with a sandy soil. A good crumbly soil will retain in 1 ft. of depth as much water as given by 2½ to 4 in. of rain. This water is lodged in the spaces between the granules, and also in a thin film over all the finer particles, and in the latter case adheres to the particles very tenaciously, and can only be partially utilised by the roots. In a sandy loam containing a total of 18 per cent. of water a crop of corn can utilise the water down to about 4 per cent., whereas in a clay soil with a total of 25 per cent. water only down to 13 per cent. could be utilised; so that the drier sandy soil actually yields more water to the crop than the wetter clayey soil.

We have now some idea about the principles of soil management in affecting the physical condition of the soil, and lime, as stated already in the introduction, plays a very important part.

Let us now consider what *lime* is, how it is found, and in which forms it can be utilised by the agriculturists.

In nature, lime is found abundantly as *carbonate of lime,* in limestone, marble, and chalk, and also forms the principal constituent of coral, sea shells, egg shells, &c. By burning or roasting of carbonate of lime (limestone) in special kilns, carbonic acid is split off, leaving *calcium oxide,* or caustic lime, burnt lime, quick lime. This form of lime has a powerful caustic action, readily absorbs water, destroys organic

$$\mathrm{Ca}\,\overset{\mathrm{O}}{\underset{\mathrm{O}}{\mathrm{C}}}\,\mathrm{O} = \mathrm{Ca\,O} \text{ and } \mathrm{C\,O\,2}$$

matter, and liberates ammonia from its salts. Left exposed to the air, quick lime slowly crumbles by absorbing water; this process is hastened by pouring water over the lime, and under evolution of considerable heat the lime changes into slaked lime

$$\mathrm{Ca\,O} + \begin{matrix}\mathrm{H} \\ \mathrm{O} \\ \mathrm{H}\end{matrix} = \mathrm{Ca}\begin{matrix}\mathrm{O\,H} \\ \\ \mathrm{O\,H}\end{matrix}$$

or *hydrate of lime* $\mathrm{Ca}\begin{matrix}\mathrm{O\,H} \\ \mathrm{O\,H}\end{matrix}$, which if left exposed to the air will absorb carbonic acid

and revert slowly back to the carbonate. In air slaked lime we have therefore a mixture of carbonate and hydrate, which is called *mild lime,* and is in excellent condition for application to the soil if required for a fairly quick action.

Agricultural lime is lime carbonate in crushed form, and is made from limestone, shells, coral sand, and fine limestone earth found in some localities. The action of this lime is very much slower and depends largely on the fineness of the particles.

Lime is also found in nature in the form of limesulphate or *Gypsum,* and may be used for agricultural purposes (plastering of soil).

Lime carbonate is only slightly soluble in water, but more so if the water contains carbonic acid; for this reason lime is leached out from the soil by rain water and sinks deeper into the ground.

Lime is an *indispensable plant food,* intimately connected in the growth of plants with the building up of proteins and carbohydrates, and for the neutralisation of excess of organic acids. Lime is necessary in the building up of the cell walls

and for this reason we find larger amounts of lime in the leaves and young twigs than in other parts of the plants. Seeds generally contain only small amounts of lime, and the young seedling plants require lime at their early stages of growth for healthy normal development.

In the life process of plants frequently acids are formed, which in excess would kill the plants. These acids, chiefly oxalic acid, are neutralised by lime and deposited in the cells in form of fine crystals (raphides), found in large amounts in rhubarb, onions, cunjevoi, prickly-pear, &c.

Lime is also necessary for the bacterial life, and increases the activity of the azoto-bacteria, which are the agents of the fixation of the atmospheric nitrogen in the soil.

Lime has a powerful action on the physical properties of a soil, and applied as carbonate of lime, oxide or hydrate of lime, will increase the water-holding capacity of any soil. Burnt lime has the quickest and strongest action on the soil structure, as it coagulates the clay, gives it crumb structure, thereby increasing the porosity of the soil; it also has a favourable action on very sandy soils by giving them more body.

Further important functions of lime are the neutralisation of organic and mineral acids present in the soil, and the decomposition of injurious compounds. Lime aids in the fixation of soluble phosphoric acid and prevents the formation of the quite insoluble alumina and iron phosphates. An application of burnt lime actually makes some phosphoric acid available from such insoluble phosphates. Lime also appears to have some action on insoluble potash salts and renders them more readily available to plant life. This action is more particularly valuable on heavy clay soils, but would lead to loss of potash in light sandy soils, and for this reason lime should always be applied in form of lime carbonate (agricultural lime) to sandy soils.

Lime has also a pronounced action in aiding decomposition of organic matters, the *humus* in the soil, producing at the same time soluble nitrogenous compounds therefrom.

Addition of sufficient amounts of lime will produce neutrality or even slight alkalinity of a soil, which is necessary for the important process of nitrification, by which organic nitrogenous compounds are gradually changed into ammonia salts, and finally into nitrates, in which form alone the nitrogen can be utilised by plant life.

The lime requirement of certain crops is a very important matter, as some plants are much more affected by soil acidity than others, and in many cases of failure to get good results after application of artificial fertiliser the cause could be traced to want of lime in the soil. The lime requirement of a crop depends on the actual lime content in the plant, on the rate of growth, on the feeding power of the plant, which again is controlled by the root system and the physical condition of the soil.

Some of the crops greatly benefited by liming are: Cabbages, cauliflower, beets, lettuce, onions, parsnips, grasses, sorghum, cotton, and citrus fruits. Some plants are injured by excessive liming; for instance, cowpeas, peanuts, and water-melons.

In olden times, very heavy dressings of lime were practised; once every fifteen to twenty years 15 tons and more of lime were applied to the land, and in many localities caused rapid exhaustion of the soil. The modern practice of applying lime in smaller quantities every three to four years is to be preferred, as being much more economical and beneficial.

The usual rate at present is 1 ton of lime per acre; this quantity adds only 0.06 per cent. (six hundredth per cent.) of lime to the soil to a depth of 12 in., amounts to about ½ lb. per square yard, and forms a layer only one hundredth of an inch deep when broadcasted, the usual method of applying lime.

In order to increase the lime content of a soil by only one-tenth of a per cent., we would require an application of 31 cwt. of quick lime, or 56 cwt. of pure lime carbonate.

THE MAIZE GRUB PEST.

A SUGGESTION FOR COTTON FARMERS.

By E. BALLARD, B.A., F.E.S., Commonwealth Cotton Entomologist.

The damage done to cotton by the Maize Grub (*Heliothis obsoleta* F.) is only too well known to cotton farmers to need any detailed description. The havoc wrought by it early in 1924 is still fresh in the memory of many.

The season which is now closing saw a very marked diminution of the intensity of attack, and it was only in a few cases that conditions obtained akin to those of 1924.

The causes of this may have been the mild winter and early rains providing an ample supply of alternative food plants and the fact that parasites, especially egg parasites, were early at work. We do not yet know the full effect of different climatic conditions on the enemies of the maize grub, so that suggestions as to whether or no parasites are affected by lack of moisture or excessive cold or heat must be speculative. Whatever the causes, the maize grub population this year was comparatively low.

The superior attraction of maize for the maize grub has been known for years, and its use as a trap crop has often been advocated both in Queensland in the departmental bulletins and in other countries. Many farmers, however, do not yet know of it, and it is for them that this article is chiefly written.

I noticed this year when going about the country that quite a number of cotton farmers had maize planted amongst their cotton, but I also noticed that it was not cut out when ripe but allowed to stand there.

Some of the observations on the maize grub made this year will probably be of interest, and will show how necessary it is when using maize as a trap to do the thing properly.

The Most Critical Time.

The most critical time for the cotton crop is during December and January, when the squares are being set. The maize grub is particularly fond of squares, and if these are eaten as they are formed the plants put on wood and nothing else, and practically no crop is harvested as there is nothing to "hold the plant down," and to keep it from putting all its energies into growing. Once bolls have really matured, although loss from maize grub will occur, the real danger is past.

At the Agricultural College at Gatton there was a large field of maize planted early in October about 300 yards from one of the experimental cotton plots. This maize during November, December, and January was full of maize grub in all stages. Only one grub was seen in the cotton. At the same time the tomatoes in the College vegetable plots some distance away were infected.

Another plot of maize, about ¾ acre, was planted with different varieties of maize on 1st November. When inspected in February no maize grub was found in this, but a lot of peach moth grubs—but, early in January, maize was sown in another part of the farm. When examined in February, it being about a month old, it was found to be full of maize grub eggs. Out of 100 plants taken at random sixty-seven had eggs laid on them, usually four or five, but in one case as many as twenty-seven on one plant. The neighbouring cotton was quite free. It will be seen from the foregoing that there was a succession of growing maize from October onwards to March, and to this maize were attracted all the maize grub moths.

In a farm not far from Rockhampton there had been a very heavy attack by maize grub; no maize was planted at all until the 24th December. This farm was visited in February. There was very little maize grub then to be found in the cotton, but wild Cape gooseberry and the growing maize were full of grubs or covered with eggs.

An Experiment.

At the Cotton Research Farm at Biloela, on the Callide, an experiment was laid down to try and work out the amount of maize required to keep cotton free from maize grub. The presence of the ordinary rotation maize on the farm rather upset the experiment, but some interesting results were obtained.

The two one-acre plots used as a check on our experiment were placed as far from any maize as we could get them, but for all that the maize did exert some influence, so that even on these plots the loss was slighter than it would have been. In the trap crop plots of 1 acre each, a row of maize was sown between each

plot, and between two of them this was followed by another row six weeks later. The first row was sown at the time the cotton was planted and cut out before the silk dried.

Not far from these plots (about 150 yards) was 7 acres of maize planted in November. Rather further away was 20 acres planted about 7th December. In January the farm was alive with maize grub moths and it looked as though we were in for a really severe attack. The moths, however, avoided the cotton and eggs were laid freely on the maize. An inspection of the cotton in the check plots showed some eggs and grubs, especially on the side furthest from any maize influences, but nothing comparable to the rate at which eggs were being laid on the maize. In the trap crop plots and those near the maize of 17th December, eggs were only found with the greatest difficulty. The grub infestation in the maize was estimated at 50 per cent. in early February.

Nine rows of maize were planted alongside cotton sown for experimental purposes late in January. This maize attracted maize grubs as soon as it began to grow and the cotton was not touched.

Actual counts were made of all the bolls from a certain number of trees in the check plots and all the bolls from a similar number of trees in the trap crop plots. These showed attacks of just over 16 per cent. and 5 per cent. respectively from boll worms of all kinds. All the boll worm attack was not due to maize grub but most of it was. Counts made later in the season gave a more even rate of attack in each plot. From this we can see how necessary it is not to leave maize standing once it is well infested. The maize planted in November which was near the trap crop plots was left to stand and not cut. Grubs from this, after turning into moths, probably made themselves all the more felt by reason of the square shedding which had taken place in February. They were not able to do any very great damage, as in spite of very bad growing conditions plenty of bolls were set, and good yields were realised.

Trap Crop Methods.

At the State Farm at Monal, a series of three plantings saved the crop from attack, as here again maize grubs were in some numbers early in the season.

This trap crop method of protecting the cotton crop will, therefore, work if properly applied. It is very dangerous if not used as it should be used. It then simply becomes a means of attracting moths to the cotton.

The idea to work for is that of protecting cotton during the critical months of November, December, and January, and the early part of February. After this latter month maize grub attacks die away. Parasites and predators have apparently got the situation well in hand by March. This year, for example, no less than eight things were attacking the grub, including a bacterial disease and a small bug which sucked the eggs laid on the maize.

Suggestion for the Coming Season.

The suggestion put forward for the coming season is as follows:—Taking a basis of fifteen rows of cotton to the acre, the rate of two rows of maize per acre should be planted at the same time as the cotton. At the Cotton Research Farm the cotton plots will be divided into 4-acre blocks with 1 acre for maize in between each block, three rows of maize will be sown at the same time as the cotton, followed five weeks later by four more rows, and five weeks later by another four, and again five weeks later by two more. These lots of three and four rows will be cut while in silk and the ground scarified to destroy the chrysalides in the soil.

Any variation of this method best adapted for individual farms could be tried. The most essential point is that the maize plants must not be allowed to stand until the "silk" has dried up.

It is suggested that it is well worth the farmers while to give this method a thorough trial. It is not guaranteed as an absolute cure, but will, *if used properly*, reduce the chances of attack on the cotton. The alternative is dusting with calcium arsenate. This method it was not possible to test properly this season, as there was not a sufficiently heavy maize grub attack on the experimental farms. It is an expensive proceeding and laborious.

Calcium arsenate is about 1s. 6d. a pound, and probably four or five applications would be necessary. Dusting machines are expensive. The trap crop method is worth a trial, and will be used on the Cotton Research Farm this year as a matter of routine. But it is worth no one's while unless he is prepared to cut the maize while the silk is still fresh. If he does this, large numbers of grubs and eggs will be killed. If the maize is left to stand over these grubs will come to maturity and infect the cotton.

EGG-LAYING COMPETITION.

MOUNT GRAVATT.

During June laying has continued to be satisfactory, an average of 17·1 eggs per bird. This average is $1\frac{1}{2}$ eggs better than for the same period last year. Two deaths occurred in Section 1—D bird of Mrs. Lindley and F bird of W. Melrose. Individual scores to date:—

SECTION 1.

White Leghorns.

Name.	A.	B.	C.	D.	E.	F.	Total.
W. E. Woodward	66	64	70	49	59	46	354
W. and G. W. Hindes	58	60	59	55	57	58	347
B. Driver	60	38	61	54	58	63	334
John J. McLachlan	58	62	59	47	60	45	331
E. J. Stilton	67	56	53	61	63	19	319
J. Harrington	46	46	54	59	56	56	317
Mrs. R. E. Hodge	55	49	50	66	42	54	316
Eclipse Poultry Farm	69	62	54	58	54	16	313
M. F. Marsden	58	44	43	37	57	62	301
Jas. Hutton	48	44	54	25	55	55	281
R. C. J. Turner	54	47	50	57	17	54	279
W. Wakefield	58	59	33	47	42	27	266
L. Bird	61	50	26	36	68	25	266
Jas. Earl	50	55	28	47	34	51	265
S L. Grenier	62	51	60	20	27	40	260
J. E. G. Purnell	51	25	51	57	39	31	254
E. Anderson	16	49	26	40	57	61	249
H. Fraser	17	50	57	47	42	30	243
G. W. Cox	39	24	44	46	39	37	229
A. S. Walters	43	46	23	38	23	55	228
N. F. Newberry	19	32	58	52	29	33	223
H. P. Clarke	22	51	21	31	47	50	222
Geo. Marks	26	49	35	24	54	27	215
Mrs. H. P. Clarke	13	49	44	32	51	23	212
T. W. Honeywill	31	1	57	38	47	28	202
Chris. A. Goos	52	4	33	46	14	45	194
T. H. Craig	20	46	29	32	22	39	188
Mrs. C. E. Lindley	24	11	30	51	30	32	178
W. D. Melrose	46	59	14	..	37	15	171

SECTION 2.

Black Orpingtons (except where stated).

Name.	A.	B.	C.	D.	E.	F.	Total.
Harry Cutcliffe	72	71	54	45	58	54	354
Eclipse Poultry Farm	58	56	67	57	57	54	349
Jas. Potter	71	44	50	54	61	66	346
Geo. E. Rodgers	36	57	62	46	58	51	310
E. W. Ward	47	50	55	54	54	49	309
W. and G. W. Hindes	73	26	36	27	47	68	277
E. Walters	26	41	37	47	61	55	267
Thos. Hindley	63	37	58	29	59	21	267
Mrs. A. E. Gallagher	40	46	51	19	41	56	253
J. Pryde (R. I. Reds)	24	48	32	58	41	50	253
Carinya Poultry Farm	53	52	8	40	58	38	249
C. Dennis	41	35	54	41	28	39	238
W. Melrose	10	45	49	60	51	13	228
R. Barnes	42	33	30	42	46	30	223
Jas. Hutton	38	27	58	48	6	28	205
E. C. Stead (Wyandottes)	..	4	5	14	25	2	50

YOUNG JUDGES COMPETITION AT AGRICULTURAL SHOWS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

It is evident that the Young Judges Competition are becoming more popular each year at our agricultural shows, both Royal National, Royal, city and country alike; indeed so popular have they become that at this year's Royal National Jubilee Show the sum of £50 has been allocated as prize money, this amount having been specially donated by Colonel Donald Cameron, M.H.R. In addition, several "Andrew Moles Memorial Medals" are being presented in the I.M.S. cattle section. Medals and trophies form the prize money also in the section in which young judges adjudicate on dogs.

The secretary of the Show, Mr. J. Bain, advises that in all there are 170 entries in these several sections for young judges, an entry which is considered extremely satisfactory. It is good to note that there is only one section—viz., the I.M.S. Cattle with twenty-one entries—in which the entries are greater than in the Pig Section with its total of twenty contestants.

Useful Hints for Young Judges.

The following suggestions have been prepared, not as the "sum total" of all young judges should note, but as indicating a number of special qualifications which fit a person to undertake the selection of animals or to act as a judge, no matter on what occasion or whatever the class of stock or product he has placed before him. The hints were in the first instance suggested for the young judges in the Pig Section in which two Berkshire boars are to be adjudicated upon, but being of general interest are published for the benefit of readers in general.

It has been noted that one of the special conditions attached to winning the Andrew Moles Memorial Medals in the I.M.S. section is that the competitor must place the six selected animals in their order of merit and state in writing the reasons for so placing, the judge in making the awards shall take into consideration the correctness of placing of the animals and the reasons given. This suggestion is worthy of emulation in other than the I.M.S. classes, for where the entry is heavy it is almost impossible for the judge to remember the remarks made by each individual contestant.

Note the Nature of the Useful Hints.

1. Be confident. Judges of any class of stock or product must know their business, they must understand the standard of excellence aimed at and the comparative value of each point on which the animal or product is judged.

Remember: The world makes way for the man who *knows*, the man who *knows* he *knows*.

2. Knowledge of your business inspires confidence. Young judges should not be afraid to ask questions on points on which they are not quite certain.

3. Be punctual in answering questions submitted to you by the judge, for judging is not guess work. If you give incorrect answers it is the duty of the judge to put you right. We live to learn.

4. Study the animal or the object you are to judge, and compare the respective points alongside those referred to in the standard of excellence.

5. Be prepared to undertake the judging of any other animal or class the judge may select to test your ability. You should practise judging and watch other judges at work as opportunity offers.

6. Study the list of disqualifications or objections to which reference is made in all standards of excellence. Judging is largely a matter of discovering faults or imperfections, and of comparing the seriousness of these faults with the increased value allowed for perfection. Some imperfections develop into disqualifications, some have hereditary tendencies, and tend to reduce the commercial value of the animal or product, some are of a less serious nature, and are not likely to influence the animal's value for show or stud purposes, but it is the animal whose scale of points approaches perfection who realises the highest value, and for whom there will be keenest competition if offered for sale.

7. Be careful in filling in your award cards, and be accurate with your figures. Officials of the society and representatives of the Press will inspect your cards.

8. Be prompt in attendance, and if unsuccessful in gaining the coveted awards, be a good loser and come up smiling again next time.

9. Carefully note the following:—In judging and selecting pigs, the following points should be specially noted:—

(*a*) Constitution as noted by general healthy appearance of animal, the quality of its skin and hair, the width between the eyes and ears, the width and depth of chest and body, the strength of the legs and feet, and by the animal's vigour.

(*b*) Pedigree.—For stud purposes, it is esential that the animal's pedigree should indicate careful breeding, that the parent stock were of reliable, vigorous and profitable strains, and that, in the case of a sire, he be unrelated to the dams to which he is to be mated.

(*c*) Type and Quality.—Type is important, as indicating the result of careful selection of the parent stock. Quality counts for much in the commercial world. Quality stock always realise top prices; they pay handsome dividends.

(*d*) Temperament.—Contentment and docility indicate the temperament of the animal. Note the appearance of the eye, a white streak in the eye is regarded as a sign of bad temper.

10. Value your animal.—A judge is quite within bounds in asking the approximate value of an animal or of its products. Practical experience and knowledge of the commerce of the animal is invaluable.

The Aim of these Competitions.

Young judges' competitions aim principally at one special objective—viz., that of training judges, not only for the purpose of judging at agricultural shows but more particularly in training them to become efficient in the selection of any class of stock they may be called upon to handle in the ordinary routine of farm work, and to know type, quality, and value when actually selecting stock for their own purposes on the farm, for there is no more important initial step in taking up stock raising than in being able to act on one's own initiative in inspecting and in purchasing breeding or store stock. It is important also when once stock have been produced that the breeder should be able to determine their commercial value and to know whether they are worth retaining in the stud or not. It is the desire of the promoters of these competitions that, as a result of the knowledge gained in taking part in them, that contestants will seriously consider following the matter up with a view to some day being appointed a judge in some one or other section of agricultural or other show activities, for certain it is that we need to train judges competent to undertake this important phase of agriculture. It is advisable for young judges to become associated with the agricultural society in the district in which they reside, as well as with the larger district and Royal shows. Junior farmers should also consider the advantages of becoming members of the Breed Societies controlling the interests of the breeds in which they are most interested, and to become subscribers to one or other of the Agricultural Journals specialising in or devoting space to these breeds.

Both the Department of Agriculture and Stock, as well as the Agricultural Societies, stand prepared to supply any further information required at any time.

For the benefit of readers who may not have immediate opportunity of taking part in the Pig Competitions at the Royal National Show, the following standard of excellence of the Berkshire breed is worthy of note. This standard should be used as a guide when practising judging and be preserved for use when actually selecting Berkshire pigs. The scale of points has been prepared also for the same purpose. It should be noted that while the standard of excellence for this breed is identical with the standard published in the Herd Books of the Australian Stud Pig Breeders' Society, the scale of points has not yet been adopted by that body for the reason that they have not yet considered same, but the matter will be discussed at the annual meeting of the Queensland branch of the society to be held at Affleck House, on the Show Ground, on Wednesday, 12th August, at 10 a.m.

Standard of Excellence and Scale of Points for Berkshire Boar and Sow.

Note.—This standard of excellence is identical with that adopted by the Council of the Australian Stud Pig Breeders' Society, in whose Herd Books Berkshires and

other breeds of pigs may be registered. The figures represent the comparative value of each point when perfect.

	Number of Points Allowed.	Points Awarded by Societies' Judge.	Points Awarded by Young Judge.	Variation in points Awarded by Societies' Judge and by Young Judge.
Colour—Black, with white on face, feet, and tip of tail (*Note.*—A perfectly black face, foot, or tail is objectionable, as also are white or sandy coloured spots, or white skin on body. White patches on inside or outside of ears are highly objectionable.)	15			
Skin—Fine and free from wrinkles (a "rose" on back is objectionable)	5			
Hair—Long, fine, and plentiful (a very coarse mane is objectionable)	4			
Head—Moderately short, face dished, snout broad, and wide between the ears and eyes	10			
Ears—Fairly large, carried erect or slightly inclined forward, and fringed with fine hair. (See note on colour)	5			
Neck—Medium length, evenly set on shoulders, jowl full and not heavy	5			
Shoulders—Fine and well-sloping backwards, free from coarseness	8			
Back—Long and straight, ribs well sprung, sides deep	10			
Hams—Wide and deep to hocks	15			
Tail—Set high and fairly large. (Note also colour)	3			
Flank—Deep and well let down, making straight underline	8			
Legs and Feet—Short, straight, and strong, set wide apart, and hoofs nearly erect. (*Note*—In-bent knees are objectionable)	12			

Note.—In boars, both testicles should be evenly developed and be free from any sign of rupture; there should be no enlargement at point of sheath. In sows, the udders should be well formed, twelve to fourteen teats being clear and distinct, well developed, and placed equidistant.

FORTHCOMING SHOWS.

Aug. 1—Pine Rivers.
1—Mount Gravatt.
5–6—Redcliffe.
10–15—Royal National.
22—Belmont.
26–27—Crow's Nest.
29—Coorparoo.

Sept. 2–3—Esk Bushmen's Carnival.
4–5—Wynnum.
12—Zillmere
16–17—Imbil.
[illegible]—Stephens

Sept. 23–24—Gympie.
24–25—Beenleigh.
26—Maroochydore.
26—Rocklea

Oct. 1—Kenilworth.
2–3—Toombul.
9—Southport.
10—Enoggera.
16—Nerang.
17—Balmoral.

Nov. 25–26—Pomona.

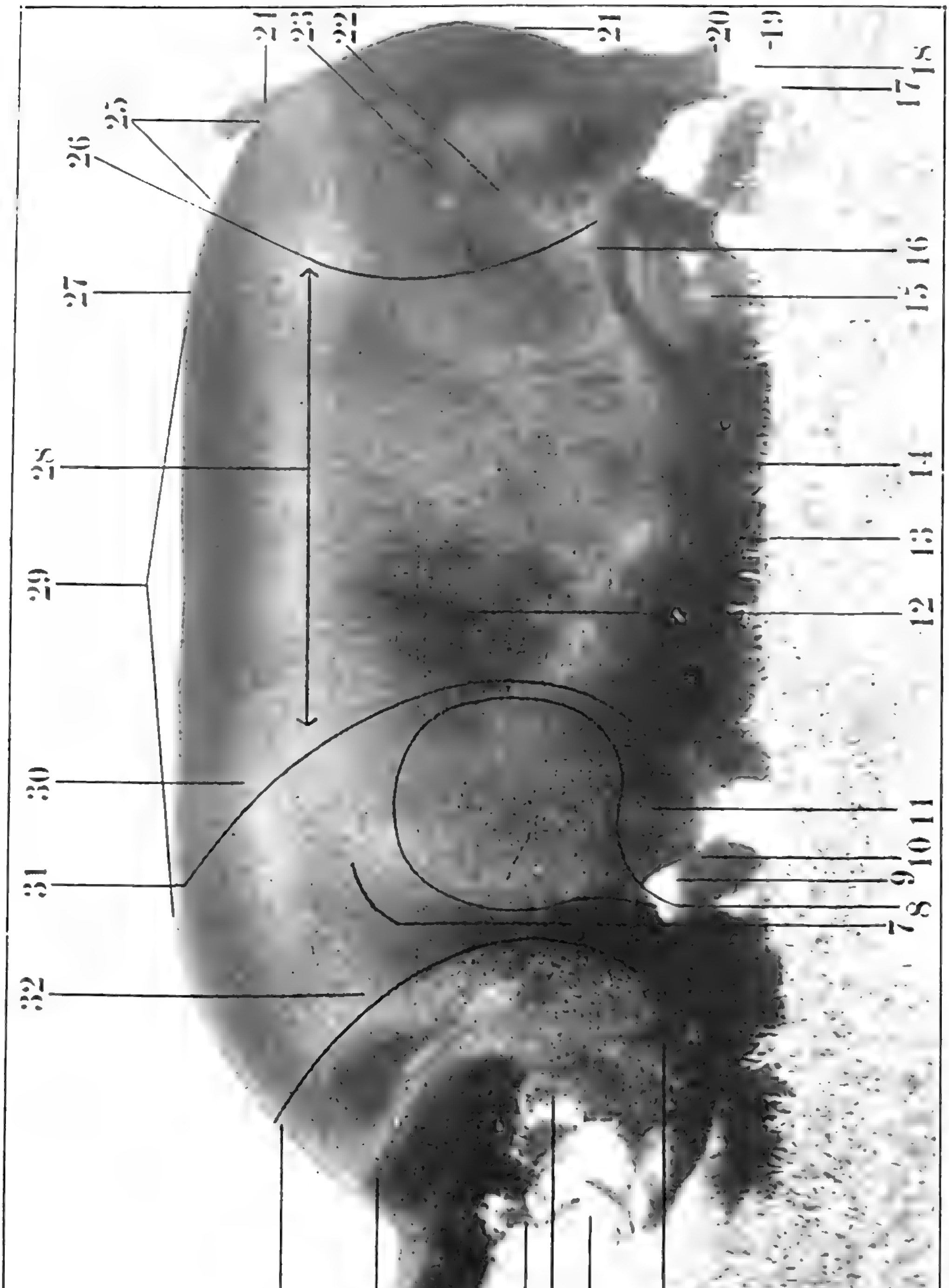


PLATE 34.—THE POINTS OF A PIG.

Description of Plate 34.

Principal Points of the Pig.

1. Head.	9. Chest.	17. Foot and Hoof.	25. Rump.
2. Ears.	10. Knee.	18. Pastern.	26. Hindquarter.
3. Eye.	11. Forearm.	19. Dewclaws.	27. Loin.
4. Face.	12. Side and Ribs.	20. Hock.	28. Middle Piece.
5. Nose or Snout.	13. Belly.	21. Site of Testicles in Males.	29. Back.
6. Jowl or Cheek.	14. Site of Sheath in Males.	22. Stifle.	30. Heart Girth.
7. Shoulder.	15. Teat.	23. Ham.	31. Forequarter.
8. Site of Shield in Males.	16. Flank.	24. Tail.	32. Neck.

Colour, Type, Conformation, Character, and General Appearance vary with the different breeds. Males should be distinctly masculine and females distinctly feminine in character irrespective of breed. The Pig is a quick-growing, early-maturing animal, hence size and condition for age counts for much. Other important characteristics are Constitution, Temperament, Pedigree, Quality, Prepotency, Prolificacy, and Adaptability.

CREAM TRANSPORT FROM FARM TO FACTORY.

By C. McGRATH, Dairy Instructor.*

Factory managers and those associated with them are well aware of the many problems and difficulties associated with the dairy industry, and which chiefly arise from the perishable nature of the product and its liability to deterioration from the time of production until it reaches the consumer.

I intend to deal with one of the difficulties that in my opinion is retarding the progress of the industry, transport of the cream from farm to factory. This matter has been considered on previous occasions, but I think that the time has arrived for discussing, with a view to improving, the general methods of handling and delivery of the cream on the factory floors.

Points for Consideration.

The chief points to be considered are—

1. Distance the cream has to be conveyed—(*a*) to rail, (*b*) to factory direct.
2. Condition of the roads.
3. Method of conveyance.
4. Suitability or otherwise of rail service.

Cream Transport.

Cream transport is of considerable interest to all associated with this important and rapidly growing industry, for it is one of the principal factors in the production of a high-class durable butter. It is the aim of all progressive butter manufacturers to produce a commodity of faultless flavour and durability. Durability looms largely as a characteristic of all our export dairy products, and is dependent upon the methods of production and handling on the farm, frequency and method of delivery from farm to factory, and methods of manufacture and storing.

The common lactic acid bacteria becomes weakened and stops developing when the formation rises to 0.6 and they give place to the rod-shaped lactic acid bacteria that will, if unchecked, produce in the cream three or four times as much lactic acid as the favourable lactic acid bacteria. This invasion by the unfavourable rod-shaped lactic acid forming organism results in imparting to the cream a strong over-acid flavour and lowers the general characteristics and durability of the product. This is one of the detrimental results of irregular and belated cream deliveries.

Delayed and irregular deliveries, whether the results of carelessness or thoughtlessness on the part of the producer or of inefficient rail or road transport, entails a loss to the producer amounting to many thousands of pounds annually.

The consequent decreased return to the producer for his labour and capital invested helps to check the expansion of the industry and retards agricultural development. Such a loss is therefore a national matter. Let the responsibility lie where it may, we know that a deficiency in transport service exists and we must not allow it to remain. It is in the interests of producers, factory managements, rail, road, and overseas transport people, and all others connected with the industry to secure proper treatment of this important article of food, from the pastures until it reaches the table of the consumers.

Organisation of and co-operation between primary producers, factory managers, and transport operators will serve to minimise to a great extent this loss to the industry. Any phase of the development and control of the industry that tends to improve the quality of its products demand attention. The dairying industry is still a comparatively young industry in this State. Most of those assembled built the factories they are at present controlling, or took over the plant they are operating. It seems but yesterday that the means of cream delivery to factories were by rail, where so served, and by horse-drawn vehicles, and when road conditions were unfavourable by packhorses. There was no competition or rivalry between these means of transport. Rail communication between dairy centres and factories was essential.

Settlement of vast areas of fertile land by dairy farmers and agriculturists followed rail communication. Where settlement preceded railways pioneering difficulties were many. With the linking up of industrial centres by rail, traffic was diverted from main roads to roads leading from the farms to the nearest point on the railway. Main road traffic became negligible and where left unattended reached rapidly a stage of disrepair.

* In a paper read at the Butter and Cheese Factory Managers' Association, Brisbane, 23rd to 25th June, 1925.

The development in recent years of the internal combustion engine and the widespread use of motor traction have revolutionised rural transport and recreated a clamant demand for good roads. Modern motor transport services and good roads are now an essential in rural and industrial development. Motor traction has become a competitor with both rail and horse traction. The motor truck has proved more economical than the horse-hauled vehicle. Rapid transport of cream from farm to factory plays a leading part in this industry's welfare. Motor traction service is suitable for carrying on this work when road conditions permit. It widens the area of operation and reduces haulage costs. Each co-operative factory should draw suppliers from within a zone that offers facilities for efficient collecting and frequent and rapid transport to the manufacturing centre. A small quantity of cream is often despatched to factories outside the zone to which it rightly belongs. This practice frequently calls for extra handling on rail and tends to bring about deterioration in the quality of the cream in transit. Zone areas served by factories should be so divided that the products from each subdivision or block can be conveniently collected and delivered at the factory.

The factory management should have control of the cream transport service. When tenders are invited, or any other system of cream haulage is being dealt with by the management, the all-important matters of frequency of service and time taken in the collection and delivery of cream should not be overlooked.

In the few instances where there is no control by factory management, two separate services of cream haulage are operating in the same area. Such a method is wasteful and results in both services being discontinued when cream supplies begin to diminish. The suppliers are placed at a great disadvantage, for with falling supplies it is difficult to make fresh arrangements. The division of the trade during the normal period does not allow of either hauler obtaining a return that will enable him to carry on when supplies diminish. No encouragement is given to provide an up-to-date plant to meet the requirements of the industry. The collection of cream from within the same area, by two distinct co-operative companies, shows a want of a true co-operative spirit and is not in the best interests of the industry. This practice, however, is the exception.

Good Roads an Economic Factor.

Extension and success of a system of road motor traction depends on good roads. Bad roads increase costs, and decrease the effectiveness of both motor and horse services. The Main Roads Board should be requested to give consideration to the matter of improving main country roads connecting primary producers with their factories or rail centres.

The full benefits of a regular and satisfactory cream transport service can be secured by the co-operation of factory managements, producers, and transport directors. The duty of all suppliers is to assist as far as possible in facilitating despatch of the cream from farm to factory. Transport delays by individual suppliers tends to increase expenses and to bring about deterioration in the quality of the cream delayed in transit. Late deliveries of cream to the factory increases manufacturing costs. Each unit connected with the industry must function in unison in order that the full beneficial results of co-operative organisation may be secured. Cream contains and transmits its quality to the product and the dairyman must take every precaution to produce and preserve all the characteristics of a cream of an A1 quality.

Railways.

The dairying industry is firmly established in districts in this State which are served by main and branch railways. Where the volume of general railway traffic is not sufficient to warrant a frequent rail service dairy farmers are placed at a great disadvantage, as regular deliveries of cream to the factory are an essential in the production of a first grade butter. To adjust their arrangements with the train time-table it often becomes necessary for suppliers to deliver cream on rail overnight, and this practice naturally reduces its quality. Delivery of cream by rail at the factory after working hours increases handling costs. These are among the disabilities associated with cream transport and delivery.

It is realised, however, that the volume of trade offering on many branch railway lines may not warrant an extension of train services. With the opening up of more agricultural country by railway extension and the consequent expansion of the dairying industry the necessity for a well organised cream transport system becomes more evident each season, and this is one of the most pressing problems that confronts butter and cheese manufacturers to-day.

We cannot afford to mark time when such a problem awaits solution. In modern times no industry can stand still and survive. As with city traffic so with industrial life one hears frequently and insistently the order to move on. The heedless

will be removed or pushed aside as they obstruct the highways of progress. We should, therefore, consider this matter important enough to warrant the appointment of a committee, composed of representatives from the several dairying districts, to inquire into the matter of cream transport. The suitability of a rail motor service on branch lines should receive consideration. The railway authorities could be asked to co-operate with this committee and give advice and assistance through their engineering and traffic offices. The committee should begin its investigations as early as possible, and should use every effort to evolve a system that will prove of benefit to the dairying industry and a service to primary producers in general.

The industry with which we have been associated for the greater part of our lives holds a leading position among the varied industrial activities of this rich State, and is destined to increase in national importance from year to year. With expansion and general progress of the industry responsibilities increase and problems become more complex. It demands co-ordination in the work of all co-operative dairy units. The collective force and ability of the many managerial and controlling bodies, rightly directed and backed by thousands of primary producers, must be applied to the many problems, administrative and financial, associated with the industry. In their satisfactory solution are wrapped up the progress of the industry and the prosperity of all engaged therein.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MAY, 1925 AND 1924, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	May.	No. of Years' Records.	May, 1925.	May, 1924.
North Coast.	In.		In.	In
Atherton	2·12	24	0·15	2·63
Cairns	4·66	43	0·10	5·22
Cardwell	3·74	53	..	1·52
Cooktown	3·08	49	0·09	2·79
Herberton	1·73	38	0·03	0·90
Ingham	3·61	33	0·25	0·79
Innisfail	12·81	44	2·77	14·20
Mossman	4·29	17	0·04	2·10
Townsville	1·37	54	...	0·15
Central Coast.				
Ayr	1·19	38	...	0·07
Bowen	1·35	54	...	0·54
Charters Towers ..	0·81	43	...	0·34
Mackay	3·93	54	0·44	6·06
Proserpine	5·01	22	0·89	3·65
St. Lawrence ...	1·84	54	0·81	0·38
South Coast.				
Biggenden	1·76	26	0·93	0·45
Bundaberg	2·64	42	0·59	0·22
Brisbane	2·87	74	5·94	1·31
Childers	2·22	30	0·91	0·65
Crohamhurst ...	5·14	30	7·61	4·29
Esk	2·03	38	3·12	0·61
Gayndah	1·54	54	0·89	0·08
Gympie	2·97	55	3·00	1·01
Caboolture	2·88	38	4·39	1·50
Kilkivan	1·88	46	2·97	0·05
Maryborough ...	3·09	53	1·18	1·65
South Coast—continued:	In.		In.	In
Nambour	4·94	29	6·30	3·47
Nanango	1·58	43	1·71	0·41
Rockhampton ...	1·51	38	0·89	0·48
Woodford	2·96	38	3·79	1·82
Darling Downs.				
Dalby	1·31	55	2·54	0·03
Emu Vale... ...	1·15	29	2·31	0·26
Jimbour	1·19	37	3·73	...
Miles	1·49	40	1·81	...
Stanthorpe ...	1·91	52	2·86	0·44
Toowoomba ...	2·24	53	1·89	0·40
Warwick	1·58	60	1·92	0·14
Maranoa.				
Roma	1·42	51	1·32	0·37
State Farms, &c.				
Bungeworgorai ...	0·55	11	1·04	...
Gatton College ...	1·71	26	1·55	0·30
Gindie	1·01	26	0·37	0·10
Hermitage ...	1·22	19	2·17	0·11
Kairi	2·13	10	. .	2·65
Sugar Experiment Station, Mackay	3·54	28	0·86	4·40
Warren	1·02	11	0·22	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for May this year, and for the same period of 1924, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Meteorologist.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JUNE, 1925 AND 1924, FOR COMPARISON.

Divisions and Stations.	Average Rainfall. June.	Average Rainfall. No. of Years' Records.	Total Rainfall. June, 1925.	Total Rainfall. June, 1924.
North Coast.	In.		In.	In.
Atherton	1·52	24	3·22	0·89
Cairns	2·81	43	6·77	2·37
Cardwell	2·06	52	1·76	1·80
Cooktown	2·03	49	1·21	3·37
Herberton	1·00	38	2·02	0·43
Ingham	2·39	33	1·48	1·20
Innisfail	7·01	44	15·61	8·26
Mossman	2·07	17	3·51	2·38
Townsville	1·26	54	1·74	0·90
Central Coast.				
Ayr	1·36	38	1·41	1·63
Bowen	1·61	54	2·03	1·84
Charters Towers ...	1·29	43	1·39	0·21
Mackay	2·70	54	3·28	1·77
Proserpine	3·54	22	4·20	1·78
St. Lawrence ...	2·45	54	3·74	1·53
South Coast.				
Biggenden	2·00	26	3·95	2·51
Bundaberg	2·63	42	7·92	0·79
Brisbane	2·73	74	7·32	4·80
Childers	2·24	30	5·12	1·30
Crohamhurst ...	4·09	30	15·09	3·30
Esk	2·08	38	3·83	3·14
Gayndah	1·88	54	1·28	1·14
Gympie	2·52	55	7·64	1·99
Caboolture	2·47	38	6·41	3·62
Kilkivan	2·09	46	5·63	1·50
Maryborough ...	2·84	53	8·73	1·35
South Coast—continued:	In.		In.	In.
Nambour	3·30	29	12·78	1·85
Nanango	2·03	43	2·86	0·93
Rockhampton ...	2·14	38	5·07	3·08
Woodford ...	2·67	38	8·06	2·70
Darling Downs.				
Dalby	1·70	55	0·60	1·52
Emu Vale ...	1·45	29	1·56	1·25
Jimbour	1·72	37	0·23	1·07
Miles	1·91	40	1·28	0·24
Stanthorpe ...	1·89	52	2·34	1·57
Toowoomba ...	2·34	53	5·30	1·24
Warwick	1·79	60	0·82	0·84
Maranoa.				
Roma	1·72	51	0·86	0·25
State Farms, &c.				
Bungeworgorai ...	1·76	11	0·59	0·23
Gatton College ...	1·79	26	2·99	2·88
Gindie	1·58	26	1·23	0·70
Hermitage ...	1·93	19	0·87	1·08
Kairi	1·32	10	3·55	0·95
Sugar Experiment Station, Mackay	2·39	28	3·17	1·55
Warren	2·08	11	4·54	3·52

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June this year, and for the same period of 1924, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Meteorologist.

BACON PIG PRICES—CURRENT RATES.

Current rates for prime quality bacon pigs are as follow:—Both weights and prices are subject to variation month by month, for all factories do not pay on the same schedule. The figures are, however, a reliable guide.

Prime quality baconers, 86 to 94 lb. dressed weight, 6½d. per lb.; 95 to 125 lb. dressed weight, 7d. per lb.; 126 to 135 lb. dressed weight, 6½d. per lb.; 136 to 145 lb. dressed weight, 5½d. per lb.; 146 to 160 lb. dressed weight, 4½d. per lb. Pigs other than prime are paid for according to weight and quality.

Prime quality porkers up to 86 lb. dressed weight, 6d. per lb. Fat sows for smallgoods manufacture, 3d. per lb. Stags for smallgoods manufacture, 1d. per lb. Boars, large or small, not accepted, as they are unsuited to bacon or smallgoods manufacture.

Note.—In the case of co-operative factories, these rates represent the advance payment for the current month. Balance of payment, if any, is paid in the form of a bonus at end of each half-year. The proprietary factories pay cash "over the scales" at time of purchase, and pay on a dressed weight basis.

QUALITY OF RATOONED QUEENSLAND COTTON.

The following review of a paper on the quality of ratooned Queensland cotton, taken from the June issue of "Tropical Agriculture," the official journal of the Imperial College of Tropical Agriculture at Trinidad, is of particular interest to Queensland cotton growers. A paper on Rain Grown Cotton and Climate is also noted. The reviewer is Professor S. C. Harland, D.Sc., F.L.S., of the Imperial College of Tropical Agriculture.

The quality of ratooned Queensland cotton is the subject of a paper by Mr. Frederick Summers in the "Journal of the Textile Institute," December, 1924. It is a curious fact that throughout the controversy which has raged in Queensland over ratooned cotton nobody has made it their business to conduct an examination of first and second year cotton to see what the difference really is. Casual examination has been made by brokers and others, but the data given in Summers's paper constitute the first attempt to settle the vexed question of the quality of ratooned cotton. The facts obtained appear to establish that in two representative samples ratoon staple was 6 per cent. shorter and less uniform than that from annual plants. The hair width was about the same, while both wall thickness and breaking load were lower in ratoon. The hair weight per centimetre was also less in the ratooned sample. It is, however, not clear whether the differences found would affect spinning quality, and it is a pity that a spinning test was not carried out with the same material. It would have been of value also to have put forward the statistical constants of the mean values obtained for the measurable characters dealt with.

While Mr. Summers is on safe ground in stating that on the whole ratoon cotton is inferior in quality to annual, his argument that the cutting back of cotton after the first crop is equivalent to the hard pruning which young fruit trees receive after planting is less convincing. The analogy is not a good one for the following reasons:—

1. Cotton of the Upland type is like a good many other tropical mesophytes. It has very little storage capacity, and lives almost from hand to mouth.

2. The severe pruning given to young fruit trees is not given after a heavy crop has just been produced. If a good bearing fruit tree were cut practically level with the ground, it would be analogous to the ratooning of cotton.

3. Cotton has no normal rest period. When cut back the new shoots produce flower buds when only a few inches long and the plants attempt to be continuously reproductive. This is far from being the case in fruit trees.

A correct physiological appreciation of the ratooning question only becomes possible when it is realised that the operation entails the removal of about 75 per cent. of the dry weight of the plant just after it has produced a heavy crop.

Mr. Summers states that there are no grounds for regarding the first year's crop as a maximum, seeing that the root system, on which crop production ultimately depends, can only develop to a limited extent during the first year. Consequently, he continues, the first year's crop must necessarily be inferior to that which can be borne in later years when the development of the root has increased. The fallacy here is in ignoring the fact that an ordinary cotton field contains something like 30,000 plants per acre and that the total mass of the root system is as much as the soil will carry. The total root system being at a maximum the first year, it cannot be above it in any subsequent year, and owing to reduction of soil fertility by removal of seed, lint, and bush, is almost bound to be less. This is why the yield of ratooned Upland is almost always less than that of the first year, unless that of the latter is reduced by abnormal shedding.

In the same number of the "Journal of the Textile Institute" Mr. Ernest Canney writes on Rain Grown Cotton and Climate. He makes a general survey of the climate factor, and from it attempts to indicate the potential capacity of the world as a whole to produce cotton under rainfall conditions. It is the belief of the reviewer that surveys of this kind are of very doubtful value, and if attempted at all should be based on physiological and climatological observations made in the areas talked about. Too many people have already sat on office chairs in England and told us where and how to grow cotton in the Colonies. Mr. Canney, however, has read the literature with extreme care and has produced an interesting paper. He lays great emphasis on cloudiness as a climatological factor, probably correctly, although data are too scanty for adequate generalisation. He is probably right from a cotton-growing point of view in regarding much of Tropical Africa with suspicion, and in looking with favour on such areas as S. Sudan, N. Nigeria, S. Africa, and the Argentine, Uruguay, Paraguay, S. Brazil belt.

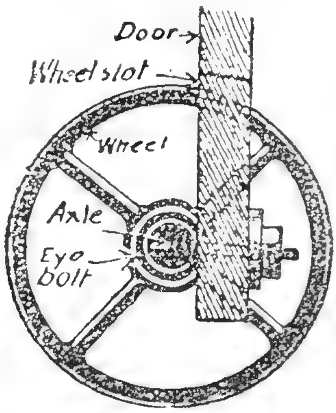
Photo.: H. W. Mobsby.

Plate 35.—Australian Wheat Exhibit at Wembley.

Photo.: N. A. R. Pollock.
PLATE 36.—GIANT FIG TREE ON THE BARRON RIVER, ATHERTON TABLELAND.
Note for comparison the size of the man on the horse at its base.

A SIMPLE REMEDY FOR SAGGING DOORS.

Wide, heavy swinging doors have a way of sagging on the ground and becoming hard to open and close. To get over this difficulty procure a light wheel, 12 or 15 in. in diameter, and having a fairly wide tyre. Cut a slot at the lower edge of the door and near its outer end large enough to accommodate the wheel and give it



SAGGING DOORS.

fairly free play. Block up the door to the desired height from the ground. Fit the wheel with an axle of proper length so that there will be some bracing strength beyond the eye bolts, one on each side of the wheel, with which it is attached to the door. Roll the wheel into position and assemble as shown in the accompanying sketch. This is the best means for handling wide doors satisfactorily.—"N.Z. Farmer."

RECENT VALUATIONS OF CERTAIN SAMPLES OF QUEENSLAND COTTON.

In order to obtain as accurate an idea as possible of the value of certain new cotton varieties that are being tried under varying conditions and in different localities in Queensland, a representative series of samples was collected by the Government Cotton Classer from last year's crop and forwarded to the secretary of the Empire Cotton Growing Corporation. He arranged for these samples to be examined and described by Messrs. Wolstenholme and Holland, one of the best known firms of cotton brokers in Liverpool, to whom we are indebted for the information given below. The samples were about 1 lb. each in weight and were taken from bales of ginned cotton last season, and they refer to the 1923-24 crop therefore. The samples were merely numbered, and the brokers, therefore, had no information as to the variety composing any particular sample or of the locality in which it was grown. The statement below gives their report.

Variety.	Mark.	Grower.	Locality.	Value.	Classification, &c.
Durango	3	Manager ..	Monal Creek Farm, Upper Burnett	16·75d. and 17d.	Good middling, slightly stained in places, staple $1\frac{3}{16}$ in., and strong
Durango	3A	Manager ..	Roma State Farm	17d. ..	Good middling to strict good middling, slight stain, staple $1\frac{3}{16}$ in., fairly strong
Durango	3B	Krapkatt ..	Mount Larcom	14·50d.	Strict middling, staple good, $1\frac{1}{8}$ in., strong
Durango	..	Krapkatt Frolich	Mount Larcom	14·25d.	Middling, staple $1\frac{1}{8}$ in. and $1\frac{3}{16}$ in., strong
Durango	3C	Ottaway and Skewes	Marlborough	16d. ..	Good middling, staple $1\frac{1}{8}$ in. and $1\frac{3}{16}$ in., strong
Durango	..	Ottaway, Skewes and Rake	Marlborough	15·50d.	Strict good middling, staple full $1\frac{1}{8}$ in.
Durango	3D	Gray ..	Wetheron ..	15·25d.	Strict good middling, staple good, $1\frac{1}{8}$ in., strong
Acala ..	4	Stephen ..	Beaudesert ..	17·50d.	Strict good middling, staple $1\frac{3}{16}$ in.
Lone Star	5	Uhlmann ..	Hemmant, near Brisbane	14·75d.	Strict good middling, staple $1\frac{1}{16}$ in., rather soft

Based on April American futures—13.00d.

The Acala was grown on a rich black alluvial flat. As it was roller ginned this may possibly have enhanced its valuation slightly, but, nevertheless, the result is sufficiently encouraging to indicate that this variety is one of great promise, and a good deal of careful experimental work and breeding has therefore been carried out on this variety during the current season. A limited amount of seed of this variety is available only, but arrangements are being made to propagate this seed on selected isolated plots scattered throughout the State during the coming season. At the same time this opportunity will be taken to study its behaviour under the varying soil and climatic conditions that occur throughout the belt.

The Lone Star was not grown under favourable climatic conditions and could not be planted early. It is a big boll type and some careful selection work has been started on this variety. These have been carried out during the present year with a view to improving the staple if possible. This work will be continued during the coming season, but it is obvious that it will be unwise to issue seed wholesale at the present time, until it has been further tested.

The Durango has shown high premiums with the exception of that grown in the Mount Larcom District. In this district the climatic conditions were unfavourable

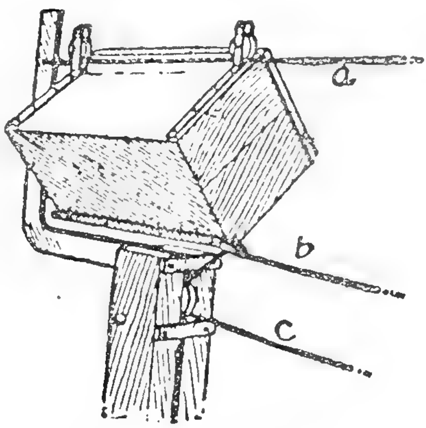
to cotton production; and it should be noted that the ordinary Upland cotton produced was also of inferior quality. With this exception, however, this variety is showing very promising results, especially in those districts a little way back from the coast. A sample of ordinary Upland cotton grown near Proston under approximately the same climatic conditions and of the same grade (good middling) as the Upper Burnett sample (3) was valued at 14.75, and sale prices generally would seem to indicate a higher value for Durango of approximately 200 points, or, put in another way, about £4 per bale of lint, due to the greater length and better regularity of the staple. This, on a 10,000 bale crop, would represent an increased value of £40,000, which would go a considerable way towards putting the industry on a more paying footing.

It is realised that these valuations are only indications of the values of these cottons, and that the final result will depend on the way the cotton behaves in the spinning sheds. Bales of Durango have accordingly been purchased by manufacturers and spinning tests are being carried out, but no reports have yet been obtained. On the present season's crop, large samples of both Durango and Acala are being sent on for exhaustive spinning tests and the results will be awaited with interest.

Sufficient has been said, however, to indicate that the Department is on the right lines when it advocates the substitution of the ordinary mixed seed by a pure variety of good quality Upland, such as Durango, more especially as this variety has been proved to yield very heavily over large areas in the cotton belt. After the plant breeders, who have already started systematic operation, have had time to produce results, no doubt it will be found that other varieties or new types of Durango will be evolved which will give as much better results as the Durango is now giving in comparison with the mixed seed, but for the present until other seed is curtailed, it would appear that obviously the wisest thing to do is to plant Durango, since this is a pure Upland type of proved merit, and the mixed seed is so rapidly deteriorating owing to the presence of degenerate hybrids that are increasing in number, that it is becoming most unsatisfactory from nearly every point of view.

MAIL BOX ON A TROLLEY.

This device isn't to encourage folks to be lazy, but there is no question but what it would be mighty convenient in some instances during the wet season. Where the house stands back some distance from the roadway a trolley can be erected, to save a lot of tramping through mud and slush to get the mail. It also means that it may save a lot of dirt being dragged into the house. A strong post with a



MAIL BOX ON A TROLLEY.

metal arm extended, as in the illustration, is set near the roadway. Suspended between it and the house is a trolley wire, A, on which the box runs. A pulley is fastened in or to the post and over it runs the cord, BC, which is attached to the box, being used to pull the box back and forth between the house and the road. The box is sent down to meet the carrier, who places the mail in it, and it is then pulled back to the house.—"American Agriculturist."

BEAN ANTHRACNOSE *(Colletotrichum Lindmuthianum).**

Mr. Henry Tryon, Government Entomologist and Vegetable Pathologist, has supplied the following reply to an inquiry by the Secretary of the Metropolitan District Council of the Local Producers' Association (Mr. J. T. M. Chataway), in respect to recent serious damage occasioned by Anthracnose to the bean crop of one of its members. Mr. Chataway asked:—''Is there (1) any remedy, or (2) preventive measures, known by your Department?''

TREATMENT.

1. Remedial Measures.

This bean disease is caused by a fungus parasite (*Colletotrichum Lindmuthianum*) operating within the tissues of the plant. It cannot be reached by any direct application of which it is made the recipient, nor is it known that soil-treatment influencing the growing plant indirectly through its root-system, has any influence on the action of the agent producing it—a remark that applies to all cultivated plants and their diseases of fungus-parasitic origin generally.

2. Preventive Measures.

We, however, know of certain preventive measures that can be pursued with success, and amongst these the following may be mentioned:—

(*a*) *Selection of site.*—This, preferably, should be of an open character, a hollow that dank foggy conditions prevail in, during the earlier hours of the day, being if possible avoided; and so, also, light loamy soil selected, rather than such as is of closer texture and heavy; and further, land that has yielded in the immediate previous year an anthracnose affected bean-crop should not be chosen, since otherwise the old plants, or remnants of them, still contained in the soil, will generally serve to convey the disease, to which they have been earlier subjected to the bean seedlings growing now therein. Should, however, the replanting of the same area be unavoidable, the ground to be used should have been ridden of its old diseased plants when whatever crop was present had been taken off, and these plants burned.

(*Note.*—Soil sterilisation by the use of chemicals is impracticable in farm practice; moreover, beans grown therein may, by reason of the fact that the soils already harbour the parasite, produce a worse affected crop than if grown in unsterilised soil.)

(*b*) *Selection of seed.*—Recognising as a fully established fact, that this bean disease, in the majority of instances of its occurrence, owes its origin to the use of seed-beans that already harbour the fungus parasite the cause of the malady, living dormant within their tissues, the following precautionary measures are called for:—

1. In selecting seed, choose that which has been yielded by a summer bean-crop, rather than yielded by one grown in the cold season—July-August—since the temperature conditions that limit the development of the parasite, prevailing during the summer, the probability of the bean Anthracnose occurrence in the field then is not at all a likely event.

2. If practicable only use bean seed from disease free sources.

3. Again, avoid sowing any bean seed that in appearance departs from what may be regarded as sound—*e.g.*, that which shows sunken, wrinkled or uneven patches, or that shows, if a red seed, any part, however small, that is of a blackish, brownish, or yellowish colour; or, if a white seed, of a brown colour, or in either case, is spotted: since the presence of the dormant parasite in the seed is indicated by these features, and better so in bean seed that is characteristically white or pale-coloured.

(*Note.*—Difference of opinion exists on the question of sterilising bean seed, in view of its being possibly disease affected, it being commonly held that ''seed treatment for beans to control anthracnose is of no practicable value'' where conditions of growth favour its manifestation. This has been stated both with regard to chemical-sterilisation and to heat-sterilisation. Steeping the seed for eight minutes in water of 122 deg. Fahr. temperature has been, however, confidently recommended —as the outcome of experiment—as adequate to effect sterilisation.)

(*c*) *The Growing Crop.*

1. Planting.—The beans should not be planted too closely, since otherwise the disease, once appearing, may be transmitted through an entire plot, principally by contact only; and, moreover, when this course is not followed the plants cannot be got at for subsequent attention.

*The word ''Bean'' here connotes the species of *Phaseolus* constituting the Canadian Wonder, the Butter Beans, and their numerous allies.

2. Cutting.—When the disease originates in the use of anthracnose-affected seed as comomnly happens, it will result that some seed will not germinate at all and there will be misses; the young seedlings will show its presence in their seed-leaves (two cotyledonous leaves); these seedlings will not grow—or its principal injuries will be remarked in the plants later on. It is therefore recommended to systematically traverse the bean-plot early in view of this possible happening, and remove, say in a bucket, all affected seedlings at once, on being thus so discovered, and forthwith burn them; for otherwise, if they are suffered to remain they may serve to propagate the trouble to clean bean plants in the same area.

3. Destruction.—Should under any circumstances (*e.g.*, the use exclusively of a special parcel of presumably disease-free seed) this bean trouble be found to be restricted to one of several plots of beans, the prompt destruction of it, and so the safeguarding thereby of the remainder, is recommended.

4. Spraying.—Bean anthracnose is usually regarded as principally a disease of the pods. However, it may early discover its presence in the foliage, leaf-stalks, and stems whilst these are still undamaged, and under these circumstances opportune spraying may constitute in some degree a useful measure of protection against further extension. Elongated brown markings with angulated borders along the leaf-veins are symptomatic of occurrences on the foliage; so also dark swollen areas involving the swollen bases of the leaf-stalks, &c.

Apart, again, from originating in disease-affected seed, this malady, after wet weather conditions, may be brought about by the spores of the parasite that have reached the ground or parts of the plant away from the spots on them of disease, being taken up by the wind and so conveyed to neighbouring clean areas; or similarly, further, this transference may have been effected accidentally by workers in the bean-plots in which anthracnose has already appeared, and these possible happenings may again justify spraying at any period in the growth of the bean plants.

The spray fluids recommended are Bordeaux Mixture in which the ingredients are in the proportion of 4-40-4 (*e.g.*, 4 lb. bluestone, 40 gallons water, and 4 lb. fresh unslaked lime) or lime-sulphur (32 deg. Baume 1-50)—the latter especially to be used if the pods have already attained two-thirds their full size—so as to prevent "staining." Insomuch, however, as the bean plant is readily injured otherwise, the Bordeaux Mixture should be quite neutral when used, as indicated by the ferro-cyanide of potassium and phenolphthalein tests. The application should be in the form of a mist-like spray and must be made thoroughly and with pressure to ensure the entire plant being reached. The use of a "spreader" in the spray fluid is also recommended.

(*Note.*—This procedure, it may be remarked, will assist in bean fly control, too.)

General systematic spraying that would need be done every ten or twelve days is not recommended, since the value realised for the crop would not at all justify the expenditure it would involve.

(*d*) *The Harvested Crop.*—When the beans are being grown with a view to marketing the green pods, it may happen that the "spotting" may become more pronounced after they have been gathered. This happening may be prevented by spraying them with lime-sulphur (1-50), turning them over on the floor to ensure thorough application, and allowing them to dry before they are packed.

General.

1. Certain of the abovementioned precautionary measures will suggest to the farmer the expediency of growing his own bean seeds, and securing them from weevil attack for future use. In this case, he will select from an apparently disease-free plot, and choose beans that come only from pods that are "clean," and discard those seeds that are in any way defective in the manner already described.

2. It may be pointed out that, other things being equal, certain weather conditions especially conduce to the presence of bean anthracnose—*e.g.*, humidity and coldness, and especially wet weather during our winter and early spring months that imply both.

3. Again, as have been well said:—"Control measures to be successful must be given consideration before the disease appears, or better before the crop is planted; and whatever measures are decided upon must be carried out completely. Frantic attempts to control the disease after it has appeared are usually a waste of time and money, and cannot be generally recommended." (M. F. Barras.)

4. Upwards of a hundred scientific workers, several of whom have prosecuted exhaustive investigations, the labour of years, have written concerning bean anthracnose from one point or another, and thus (to me also, I having too studied the subject) the need for further investigation is not very pressing.

Plate 37.—Australian Bakery at Wembley, where the Culinary Properties of Australian Flour were Demonstrated.

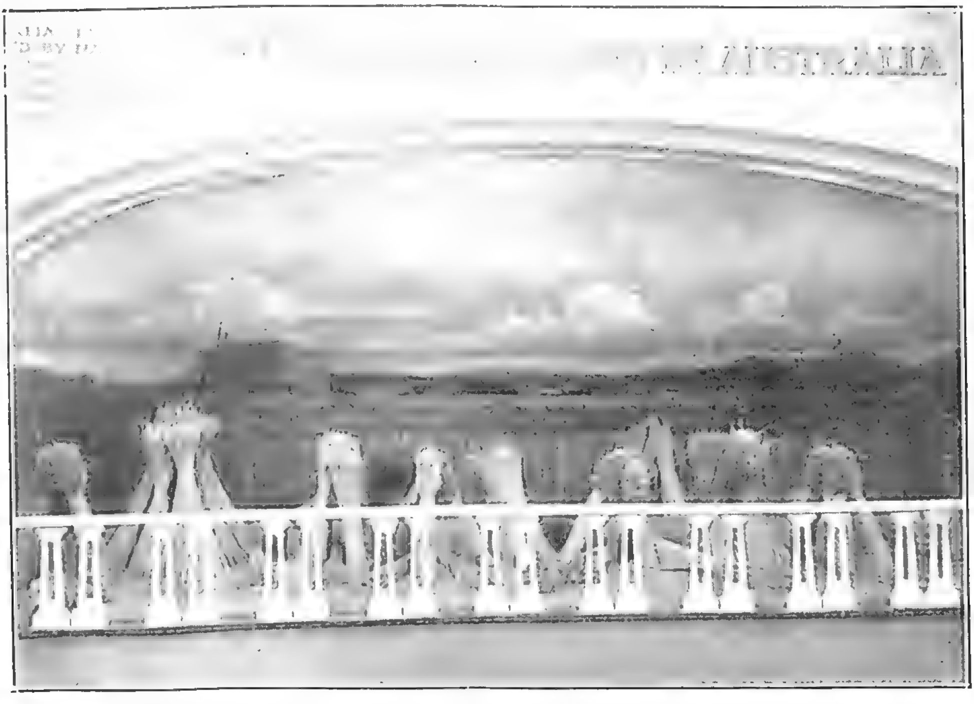


Photo: H. W. Mobsby.]

Plate 38.—Diorama at Wembley. Wheat Harvesting in Australia.

Photo.: N. A. R. Pollock.]

PLATE 39.—EMU APPLE TREE AT CHARTERS TOWERS.

This native tree is appreciated for its shade in sparsely timbered stock districts.

A THRIFTY, PROFITABLE LITTER.

This illustration of a large, thrifty, and profitable litter of Berkshire-Tamworth cross pigs, the property of Mr. George Stanfield, of "Stanberry," Wondai, indicates the wonderfully prolific nature of carefully selected strains of pigs. Mr. Stanfield states that the litter, fourteen in number, were eight weeks old at the time the photograph was taken. They were sired by a Berkshire boar purchased from Mr. W. Middleton, of Wyreema, and the dam is a Tamworth sow purchased from the stud at Queensland Agricultural High School and College, Gatton. Sows of this cross mated back to an unrelated Berkshire boar also give excellent results in the production of the fleshy early-maturing bacon pigs so much in demand in these days.—E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Plate 40.—A Thrifty, Profitable Litter.

Litter of Berkshire-Tamworth Pigs, fourteen in number, 8 weeks old, the property of Mr. George Stanfield, "Stanberry," Wondai. The sire was a pedigreed Berkshire boar, purchased at Wyreema, and the dam a Gatton College Tamworth sow.

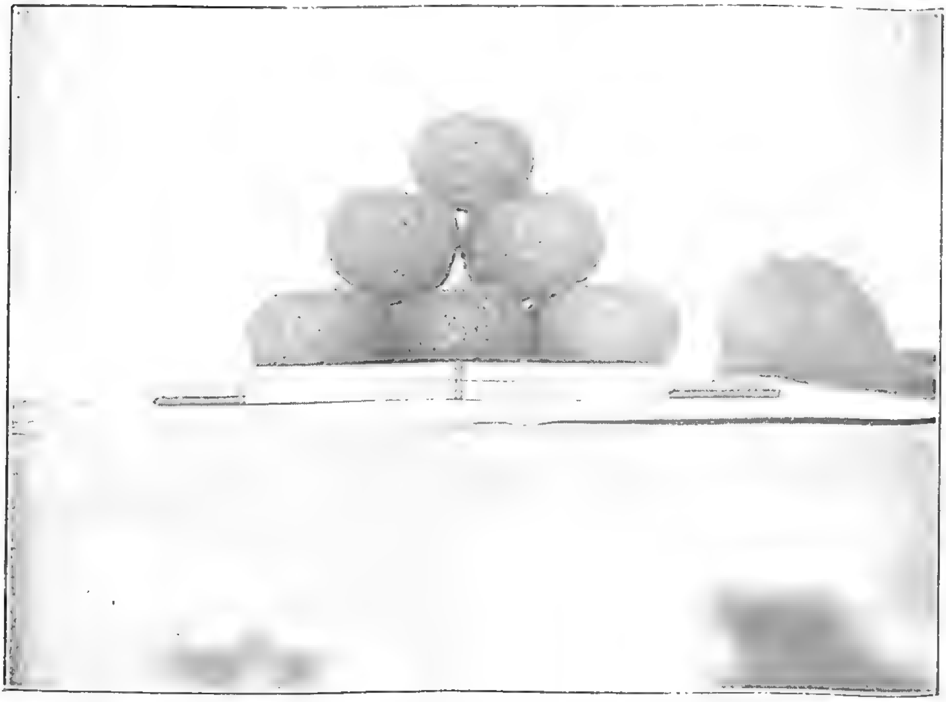


PLATE 41.—KING OF SIAM MANDARINS.
1st Prize Townsville Show. 1 doz. weighed 9 lb. 12 oz. Average weight each, 13 oz. Grown by Pilcher Bros., Pentland.

Photo.: N. A. R. Pollock.]

PLATE 42.—IN A NORTHERN JUNGLE. THE BLAZED TRAIL—A SHADOWED VISTA THROUGH GORGEOUS TROPICAL VEGETATION, PALMERSTON SCRUB, NORTH QUEENSLAND.

MARKETING PIGS IN QUEENSLAND.—III.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The marketing of his products is claiming much closer attention from the man on the land, and in this series Mr. Shelton describes how the farmer's pigs are handled at the selling end. In previous instalments in the June and July Journals several marketing systems with which Queenslanders are familiar were reviewed, and in the third article are many points of equal interest to the wide-awake pig-raiser.—Ed.

Brief reference has been made in preceding articles dealing with the subject of marketing to the prospects of the industry and to the possibility of an extension of operations, not only in districts now opening up but also in districts where the industry is already firmly established and where regular markets exist both for porkers, baconers, and store pigs.

From a perusal of Table I. herewith it will be noted that the total number of pigs in Queensland on 31st December, 1923 (the last date to which the figures available at time of writing referred),* was 132,243 head, a total which falls short of the totals of ten years ago by almost 8,000 head. The pig population of a few years later, viz., 1917, totalled over 40,000 head more than at the recent census, see also Table II., and compare with centesimal increase or decrease as shown in Table III. The return showing the number of pigs in the Southern, Central, and Northern divisions of the State, as at 31st December, 1923, is also of interest, as showing that, at present, despite the immense possibilities of the industry there are but very few pigs in the Central and Northern portions of the State in comparison with the immense area included in the Southern Division. (See Table IV.)

TABLE I.

Year 1922—Number of pigs in Queensland ..	160,617
Year 1923—Number of pigs in Queensland ..	132,243
Numerical decrease in 1923	28,374
Centesimal decrease in 1923	17.67

TABLE II.

Return for Ten Years Showing Number of Pigs in State.

Year 1913	140,045
Year 1914	166,638
Year 1915	117,787
Year 1916	129,733
Year 1917	172,699
Year 1918	140,966
Year 1919	99,593
Year 1920	104,370
Year 1921	145,083
Year 1922	160,617
Year 1923	132,243

* Owing to rearrangement of termination of financial year in the Statistician's Office it has not been possible to secure statistics for the year 1924, except in one or two instances. These figures will be available later.

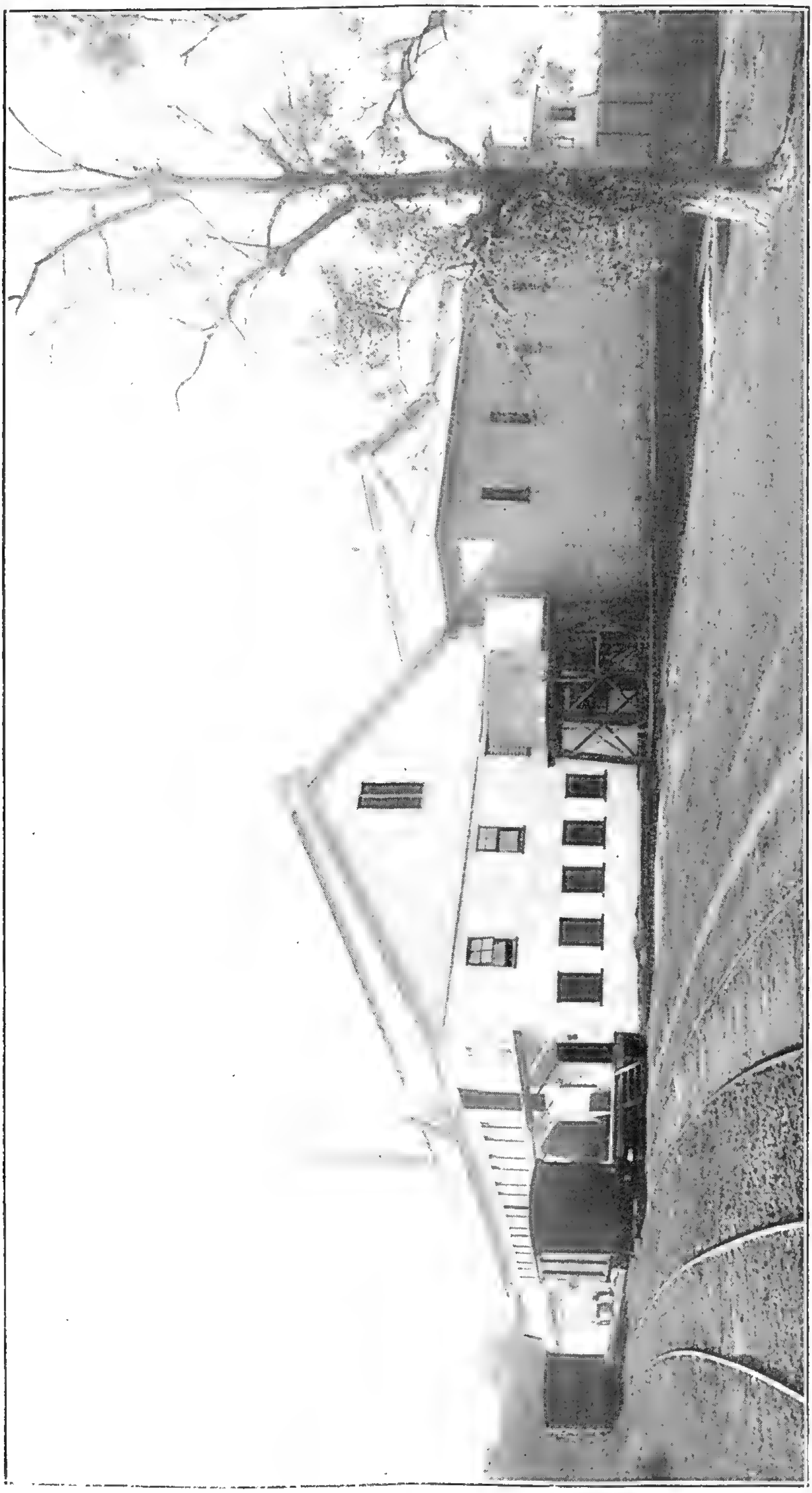


PLATE 43 (Fig. 1.)—QUEENSLAND CO-OPERATIVE BACON ASSOCIATION, LTD., BACON FACTORY, MURARRIE—VIEW FROM RAILWAY.

Plate 44 (Fig. 2).—View of New Curing Room and Store Room recently Opened at Bacon Factory, Murarrie.

TABLE III.

Return Showing the Centesimal Increase or Decrease in Numbers of Pigs in Queensland for period named.

Year 1913—Centesimal decrease	2.54
Year 1914—Centesimal increase	18.99
Year 1915—Centesimal decrease	29.31
Year 1916—Centesimal increase	10.14
Year 1917—Centesimal increase	33.12
Year 1918—Centesimal decrease	18.37
Year 1919—Centesimal decrease	29.35
Year 1920—Centesimal increase	4.80
Year 1921—Centesimal increase	39.01
Year 1922—Centesimal increase	10.71
Year 1923—Centesimal decrease	17.67

TABLE IV.

Distribution of Pigs in Queensland, 1923.

Southern Division ..	115,128 head representing	87.06 per cent. of total.
Central Division ..	6,388 head representing	4.83 per cent. of total.
Northern Division ..	10,727 head representing	8.11 per cent. of total.

For comparison of total number of pigs in Queensland with that of the other States, see Table V., which also indicates that we have a good deal of leeway to make up before we can boast of as large a pig population as that carried in the Southern States. Nevertheless, though these figures might be somewhat depressing, the figures quoted in Table VI. indicate that the pig industry is a very live business in this State and that it is of very considerable national importance.

Percentage on Farms.

It has been estimated that our pig population is distributed on farms somewhat as follows:—

On Dairy Farms	60 per cent.
On Mixed Farms	30 per cent.
On Suburban and Metropolitan Piggeries, Butchers' Piggeries, &c.	8 per cent.
On Stud Piggeries	2 per cent.

Distribution of Breeds.

It has been further estimated that the proportion of each breed on farms in Queensland is approximately as follows:—

Pigs of the Berkshire breed	40 per cent.
Pigs of the Yorkshire breed	12 per cent.
Pigs of the Tamworth breed	7 per cent.
Pigs of the Duroc-Jersey, Poland-China, and Gloucester Old Spot breeds ..	1 per cent.
Crossbred pigs, Large Black grades, and pigs of no recognised pure breed ..	40 per cent.

It should, of course, be noted—and this is important in dealing with the subject of marketing—that the pigs in Queensland generally are of good average quality from the standpoint of the bacon curer, and though the percentage of pure-bred pigs actually eligible for registration in the Herd Books of the Australian Stud Pig Breeders' Society is lower than it should be, breeders are now more than ever realising the advantages of improved breeds of pigs, and sales of stud pigs for breeding purposes are increasing largely annually. Even in the percentage stated as being crossbred or pigs of no recognised pure breed, there would be found many pigs of good type and quality. There are, however, too many wild pigs as well as many mongrels in the State, but as these are nowadays of much lower or of no

commercial value in comparison with pigs carrying improved breeding and quality, they are not being used in the production of bacon and hams as they were formerly. No figures are available to show the number of such "Wild" or "Bush" pigs.

TABLE V.

Number of Pigs in each of the Six States of the Commonwealth and also Northern Territory and Federal Capital Territory.

Year 1922—Number of pigs in Queensland ..	160,617
Queensland (December, 1923)	132,243
New South Wales (June, 1924)	323,196
Victoria (June, 1924)	259,795
South Australia (June, 1924)	73,414
Western Australia (December, 1923)	61,478
Tasmania (March, 1924)	47,101
Northern Territory (December, 1923)	647
Federal Capital Territory (June, 1924) ..	434
Commonwealth Statistician's Totals for Commonwealth, 1924	897,874

TABLE VI.

Total value of Bacon, Hams, and Lard manufactured in Bacon Factories of Queensland.

1920.		
Bacon and Hams ..	11,031,691 lb. ..	£902,807
Lard	474,426 lb. ..	33,601
Other Products ..	.. ..	321,148
(includes Pork) ..	200,970 lb. ..	11,194
Total		£1,257,556
1921.		
Bacon and Hams ..	11,973,725 lb. ..	£772,194
Lard	800,280 lb. ..	31,867
Other Products ..	.. ..	289,231
(includes Pork) ..	987,309 lb. ..	45,696
Total		£1,093,292
1922.		
Bacon and Hams ..	15,130,545 lb. ..	£729,688
Pork	901,894 lb. ..	41,912
Lard	781,650 lb. ..	26,943
Other Products ..	.. ..	252,239
Total		*£1,050,782
Pigs slaughtered, 181,108.		
1923.		
Bacon and Hams ..	16,219,969 lb. ..	£911,840
Pork	541,923 lb. ..	24,847
Lard	833,159 lb. ..	35,904
Other Products ..	.. ..	197,061
Total		*£1,169,652
Pigs slaughtered, 200,234.		

*Includes for 1922 and 1923 farmers' pigs, bacon, hams, and pork, also pigs killed and pork obtained at meatworks.

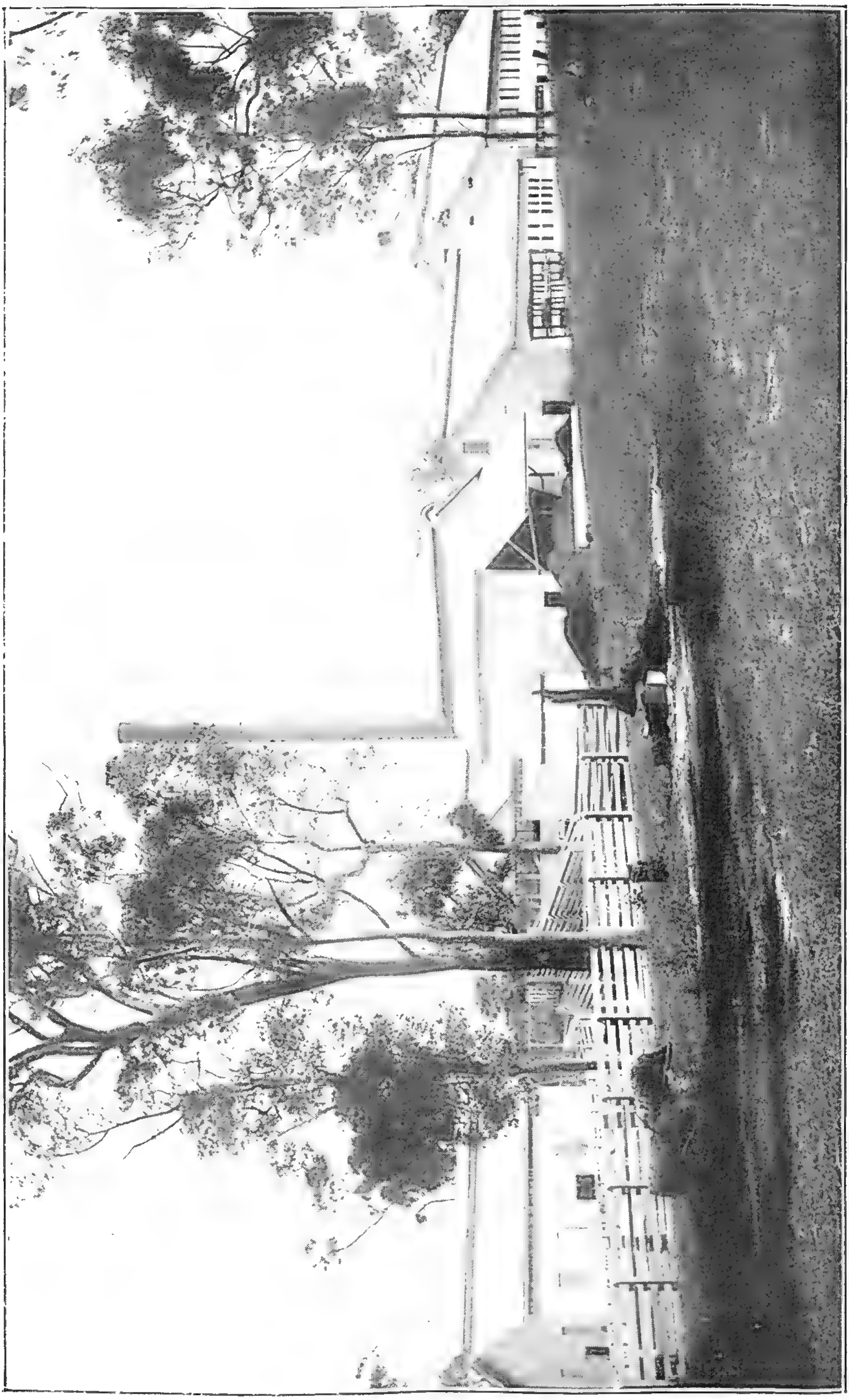


PLATE 45 (Fig. 3).—QUEENSLAND CO-OPERATIVE BACON ASSOCIATION'S FACTORY AT MURARRIE—ANOTHER VIEW.

Plate 46 (Fig. 4).—View of Portion of New Curing Room, Murarrie Bacon Factory.

Table VII. shows the number of Bacon Factories in this State, with output, &c.

TABLE VII.

Return showing the number of Bacon Curing Factories in Queensland, with Output, &c.

Year.	Kind of Establishment.	Number.	Number of Hands Employed.	Value of Machinery and Plant.	Value of Land and Premises.	Value of Output.
				£	£	£
1922	Bacon factories ..	6	404	63,039	109,955	987,480
1923	,, ,, ..	6	421	69,782	111,507	1,129,070

In addition to the six old-established bacon factories in Queensland—viz., Zillmere, Oxley, Willowburn, Toowoomba, Maryborough, and Murarrie—there has recently been established the North Queensland Co-operative Bacon Company, Limited, with factory at Floreat Siding, Mareeba, which centre is adjacent to the Atherton Tableland. There is also a bacon factory at Warwick conducted by the Warwick Bacon Company, Limited; while in the Central Queensland district bacon curing and the manufacture of smallgoods, &c., is carried on by Messrs. Conaghan Brothers, Limited, East street, Rockhampton (formerly the Farmers and Producers' Co-operative Company). This latter factory, however, is not at present continuously engaged in bacon curing, &c., this addition being an adjunct to the butchering business carried on by this firm.

Table VIII. is of interest also as showing the total quantity and value of the manufacture of pig products over a series of years; while Table IX. gives details of the export, which it will be noted is at present not large.

TABLE VIII.

Return for ten years of Pigs slaughtered for Bacon, Hams, and Pork in the State of Queensland.

Year.	Number of Pigs Slaughtered.	Production of—		Quantity of Lard Produced.
		Bacon and Hams.	Pork. (*a*)	
		Lb.	Lb.	Lb.
1913	172,084	13,709,716	670,345	836,353
1914	174,653	13,339,131	522,477	929,610
1915	174,980	12,363,939	884,736	698,905
1916	137,919	10,427,649	737,606	622,369
1917	170,490	14,791,540	808,518	761,060
1918	208,498	16,476,480	890,252	854,161
1919	166,575	12,155,489	721,072	656,547
1920	132,049	11,337,050	668,445	474,426
1921	160,205	12,386,417	1,506,982	800,280
1922	181,108*	15,130,545	(*a*) 901,894	781,650
1923	200,234†	16,219,969	(*a*) 541,923	833,159

(*a*) Pork (salt and fresh).

*9,728 pigs killed by farmers and 1,035,927 lb. of pork and bacon made therefrom during 1922 are included in this Table.

†7,933 pigs killed by farmers and 816,854 lb. of pork and bacon made therefrom during 1923 are included in this Table.

TABLE IX.

Quantity and Export Value of Hams and Bacon, Queensland.

—	Imports.		Exports.	
	Lb.	£	Lb.	£
1919-1920	2,230	176	1,264,542	111,757
1920-1921	352	39	1,514,250	157,944
1921-1922	416	43	1,515,588	122,843
1922-1923	Figures	not	available	91,745
1923-1924	,,	,,	,,	77,107

The Queensland Co-operative Bacon Association, Limited, Murarrie.

The illustrations (Figs. 1, 2, 3, and 4) are of the Queensland Co-operative Bacon Factory, Murarrie, one of the largest and most up-to-date bacon factories in Queensland. Situate as it is but seven miles on the south side of the river, at Brisbane, on the Cleveland line, it occupies a prominent position in a rapidly developing suburb, and is destined to become a factory of considerable importance in the commercial life of the Greater Brisbane area. Though our factories are not, of course, to be compared in size with the huge packing houses of the American cities, it can be fairly claimed that they are equally as efficient in their methods of manufacture and handling of the product.

The company commenced operations in August, 1913, and the figures as under show the number of pigs treated and the amount of sales for each year since:—

	No. of Pigs Treated.	Sales. £ s. d.
1914 (ten months) ..	27,024	63,048 5 7
1915	23,762	83,100 11 9
1916	21,274	73,636 2 4
1917	28,079	92,895 1 1
1918	21,656	114,712 7 6
1919	21,362	102,486 12 1
1920	21,700	123,904 8 6
1921	25,889	156,543 17 10
1922	33,444	157,312 10 2
1923	43,720	179,576 9 10
1924	35,862	199,156 5 9
	303,772	£1,346,372 12 5

This is a purely co-operative company, and during the past four years bonuses amounting to approximately £20,000 have been returned in cash to suppliers of pigs.

This factory, built to treat 1,000 pigs per week, has on many occasions been hard pressed for necessary space and storage, hence quite recently the curing and store room accommodation has been increased, so that now the factory is capable of handling up to 2,000 pigs per week.

The Sale of Stud Pigs for Breeding Purposes.

It is satisfactory to note that as a result of the continuous efforts on the part of the Department of Agriculture and Stock, the combined efforts of the several bacon factories, and the support of the Queensland Branch of the Australian Stud Pig Breeders' Society, quite a noticeable improvement has taken place in the quality of the pork and bacon pigs being marketed during the past two or three years. Coincident with this there has developed quite a keen demand for better quality boars and sows with which to stock up new piggeries or with which to replace animals that have been culled for one reason or other. The number of breeders handling stud pigs has increased, and as a result a great deal more interest has been taken in the exhibition of pigs at shows and in the Stud Pig Sales which are held each year during the currency of the Royal National Show at Bowen Park, Brisbane. This year's exhibit of Stud Pigs at Brisbane Show, for instance, breaks all previous records both for number, quality, and variety of entry, some 250 head or more having been entered. The entry at Toowoomba Royal Show and at the Rockhampton Show this year also created new records, whilst at shows in the South Burnett and in the South Coast districts, Beaudesert, &c., there was quite a substantial entry.

These shows are, of course, not only intended to create the opportunity for breeders to exhibit their animals; the shows, particularly the Royal National, are noted for the annual Stud Stock Sales to which breeders from all parts of this and sister States look for supplies, hence Stud Pig Sales provide a very valuable

PLATE 47 (Fig. 5).—THE LARD ROOM AT THE MURARRIE BACON FACTORY.

PLATE 48 (Fig. 6).—A LINE OF PRIME BACON PIGS AWAITING SLAUGHTER.

Note their length, quality, and the medium weight and fleshy condition. There is no demand now-a-days for heavy weight overfat Pigs.

"market" for the product of the stud pig farm; they also are of very considerable advertising value, and many private sales follow as a result of the shows. Indeed, to many breeders these annual Stud Stock Sales are an inspiration; they become one of the principal aims of the stud farm. That they have proved successful is demonstrated by the fact that every year sees larger entries coming forward and better prices being obtained for selected animals.

A great deal has been done by what might correctly be called the live stock mail order sale system. The writer, for instance, has selected, crated, and despatched some thousands of stud pigs to farmers in distant parts of the Southern States, and more recently has been doing something on these lines in Queensland in an endeavour to assist breeders unable to attend the sales, yet who desire to secure selected males and females for their studs.

This year's Brisbane Show Sales should also constitute a record, for some of the finest pigs that have ever been exhibited at a Brisbane Show, or at any other show in this State, will be on offer, and breeders should not lose the opportunity of inspecting or of making due inquiry as to the stock available. The writer will be pleased to assist breeders in any part of the State in these matters.

Values of Stud Pigs.

It is difficult to quote values in so far as stud stock is concerned, but in general the higher quality prize-winning animals and their progeny can safely be valued at one guinea per month of age up to twelve months old—that is to say, a selected boar or sow six months old is honestly worth six guineas. After twelve months of age the value depends entirely upon the animal's special qualities, its pedigree, and prize record, &c. Some Queensland farmers think the values referred to above are excessive. The writer does not, for it is claimed that it does not pay to produce stud animals unless they will realise more than bacon or pork values and show a working margin that will allow for crates, cartage, correspondence, feeding, and extra attention.

Sows in pig and boars at a serviceable age are always in good demand, whilst at recent sales young pigs have sold remarkably well. This subject will be referred to in more detail in the September Journal, when a report of the Stud Sales and illustrations of some of the prize-winning animals will be given, as well as further notes on the marketing question generally.

(To be continued.)

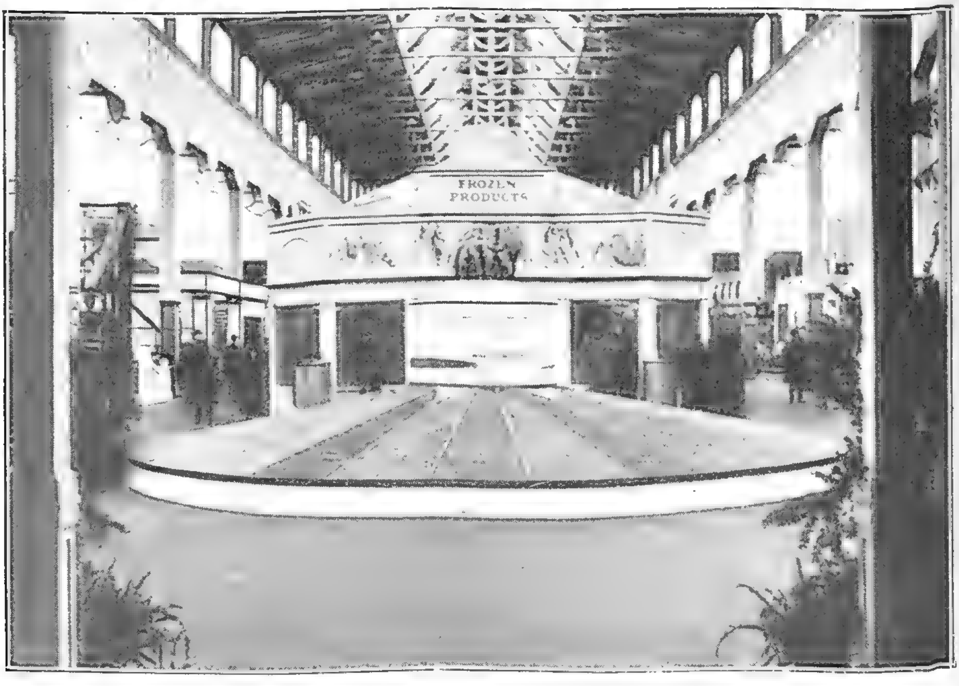


Plate 49.—Display of Grains at Australian Pavilion, Wembley, 1924.

PLATE 50.—NORTH COAST PIG CLUB SCENE—BACON PIGS IN PROCESS OF FATTENING.

Visit of inspection to a Club Member's Pig Pen at Mapleton. The group includes the Head Teacher Mapleton State School (Mr. Watt), the Instructor in Pig Raising (Mr. Shelton), and Club Members.

A VALUABLE DEPOSIT OF LIME.

N. A. R. POLLOCK, Northern Instructor in Agriculture.

What must be considered as a unique and valuable deposit of calcium carbonate, or lime earth as it is popularly called, occurs near the north bank of the Reid River, somewhat over a mile down the river from the Reid River Railway Station, on the Great Northern Railway, thirty-five miles from Townsville.

Though limestone in a bed of 50 feet in thickness may be found tilted at various angles in the hills nearby, it is improbable that this lime earth was derived from its disintegration, but would rather appear as if it had never been subjected to sufficient pressure to cause it to solidify.

The area of the deposit must be very considerable, as except on approximately 2 acres, which are exposed, the balance is covered by soil and detritus. The depth has not been proved, but probably is considerable.

The material is remarkably pure, analysing on an average nearly 90 per cent. $CaCo_3$, the balance being mainly insoluble, while there are no stones or large particles

PLATE 51.—LIME DEPOSIT, REID RIVER, NORTH QUEENSLAND.

such as might be expected were it formed from the disintegration of limestones. The remarkably fine state of division also is evidence of its deposition *in situ*.

The illustration depicts a portion worked by Messrs. Webb and Wordworth, where it will be noted the material is broken down with picks and shovelled through a screen, after which it is bagged and carted to the railway. A portion adjoining is worked by Mr. T. Ryan, who also supplies burnt lime from a quarry in the limestone bed previously mentioned at Calcium Siding, nearer to Townsville.

The price of the lime earth delivered on trucks at the Reid River Railway Station is 20s. per ton plus the cost of bags.

For agricultural purposes this lime is very suitable, since it is in such a fine state of division, being in this direction much superior to the average pulverised limestone available, while the price must be regarded as very reasonable.

Very many of the soil areas on the northern coast are deficient in lime or give an acid reaction, much benefit having been experienced with this lime by the many farmers using it.

Though not so quick in its action as burnt lime, it is equally as effective in the long run, and is to be recommended applied as a top dressing of 20 cwt. per acre, or when more is required an additional application after six months or a year.

General Notes.

Not a Bad Word for Australia.

A prominent Californian ranch owner writing to Mr. W. G. Brown, sheep and wool expert of this Department, for information on the resources of this State, has something interesting to say, from the American viewpoint, of Australian development. He writes, *inter alia*, " 'I have never heard a man say a bad word of Queensland or Australia yet' is a common expression in this Western country."

The Main Features of a Good Dairy Farm.

Dairy farming may be likened to a chain, in that it is only as strong as the weakest link. Many dairy farms have serious weaknesses, which nullify much good work.

The main features or "links" in the "dairy chain" are:—

1. Good pastures of suitable grasses for milk production.

2. A permanent water supply, and adequate fodder reserves.

3. A tested herd, with available records of each cow's milk and butter fat production.

4. A "quality" pure-bred herd sire.

5. A system of pasture dressing, and drainage of low areas.

6. Well laid out dairy buildings and yards, where dirt can be reduced to a minimum, and where the herd can be handled with ease and satisfaction.

7. Satisfactory arrangements for cleansing dairy utensils, and the care and storage of cream.—"Victorian Journal of Agriculture."

How Much Butter Fat?—Quantity and Test.

Supplying a dairy factory often tends to emphasise in the minds of dairy farmers the percentage of butter-fat in the milk (commonly called the "test") rather than the quantity of butter-fat. Although the education which herd-testing has helped to develop has done much toward dispelling this tendency to think in terms of "test" (writes W. M. Singleton, in the "New Zealand Journal of Agriculture"), one still finds many dairymen who are apt to stress the importance of the butter-fat percentage. Unless the herd is used for supplying milk for human consumption, when a certain legal minimum of fat has to be adhered to, the "test" itself can be taken too seriously.

And, after all, even dairy factories do not pay out on test, but on test multiplied by weight of milk supplied—a very different matter. There is also a tendency, though less frequent, to stress milk-quantity, though this is not so common as in those countries where records are taken for yield of milk alone.

A good example of the inaccuracy of judging milk production by test alone, or by quantity of milk alone, is found in a study of the records of pure-bred cows under C.O.R. test in New Zealand. Taking all Friesians (413) in the two-year-old class which have gained certificates since the commencement of the C.O.R. system in 1912 to the end of 1923, it is found that the six highest testing individuals averaged 4.74 per cent., and the six lowest only 2.79 per cent.

Judging from the test alone, the first-mentioned were 69 per cent. better cows than the lower testers. On the other hand, on milk alone the higher testers yielded on the average 9,601.4 lb., and the lower testers 16,012 lb.; so that, judged on milk alone, the latter group was approximately 67 per cent. better than the first.

When one comes to butter-fat, however, it is found that the average production for the groups was 455.19 lb. for the six higher testers, and 447.26 lb. for the lower—an actual difference in production of only 7.93 lb.

All things considered, therefore, it is not right to judge a cow by milk alone nor by test alone. The only fair and accurate guide to the ability of the dairy cow is her butter-fat yield for the season.

Whitewash Formulae.

Lime or whiting (which is carbonate of lime) is the basis of the more common mixtures for whitewashing walls and ceilings of farm buildings, dairies, &c. The following are among the formulæ which have been found in practice to be most satisfactory for the purpose.

One of the best whitewashes, and one which can be relied on to make a brilliant and enduring coating, both for indoor and outdoor work, is the formula used by the United States Government in all their important work, such as lighthouses and public buildings—it is the one used for the painting of the White House in Washington. It is as follows:—Unslaked lime 2 pecks, common salt 1 peck, rice flour 3 lb., Spanish whiting ½ lb., glue (clean and white) 1 lb., water in sufficient quantity. Slake the lime in a vessel of about 10 gallons capacity, cover it, strain, and add the salt previously dissolved in warm water. Boil the rice flour in water, soak the glue in water and dissolve on water bath, and add both to the mixture, together with the whiting and 5 gallons of hot water, stirring all well together. Cover to protect from dirt, and let it stand for a few days, when it will be ready for use. It is applied hot.

The following formula provides a cooling covering for either rough timber, brickwork, or corrugated iron, and is said to be as effective in reducing temperature as the best of the refrigerating paints:—Quicklime 10 lb., glue 1 lb., powdered alum 1 lb. Slake the lime with hot water, keeping it covered during the process. Dissolve the glue and the alum in hot water, and mix well together with the slaked lime. Do not make too thin. Strain the mixture and cover for two or three days, when it is ready for use. Apply two coats, the second after the first has been well set.

Early Tomatoes.

Planting of tomatoes in the open cannot take place until the district is clear of frosts unless means be taken to shelter the young plants every evening. For early crops the young plants must be got ready in a cold frame, in order that they may be planted out as soon as the weather has become favourable.

The seed or plant bed may be made any desired size, according to the extent of cropping, and a frame of the required size may be built on the plot. The seed may be sown in shallow boxes under cover or in the frame, and covered with a sprinkling of fine loamy soil. One or two ounces of seed will produce more than sufficient plants for 1 acre. As soon as the plants are large enough to handle (2 or 3 in. high) they should be transplanted into the frame, the soil in which by this time should have been worked up to the finest condition and tilth.

The plants should be set out in rows 5 or 6 in. apart, with the same distance between plants, setting each plant opposite the space in the previous row. Here they remain and grow until time for transplanting into the field; and by removing the frame cover, giving them air, light, and sunshine on fine days, and covering up in the evenings or during spells of frost, they should presently become stout and stocky plants. After they are once set out, do not give them much watering, or they may be inclined to draw up and become lanky and tender.

The main points in a frame or seed-bed are to keep it dry and warm and to protect it from winds, which cause considerable damage. In transplanting into the frame, care must be taken that the plants are not much lower than in the seed-bed, as the deeper they are set the more liable they are to damp off. If any plants have got rather down in the seed-bed, and become long-shanked, they should be laid slanting, just below the surface, and they will take root along the stem, and become stout and stocky plants. The drier the bed is kept (with discretion) the better, for tomatoes have their full share of fungus trouble.

When the plants becomes 5 or 6 in. high, some will want to outrun their neighbours; these should be pinched in a little so as to allow the weaker plants to come up uniform in strength before putting out. Any suckers that may appear should also be removed if it is intended to grow for early fruit.

As a precaution against seed-bed troubles with tomatoes, only soil that is free from contamination by tomato and potato rubbish should be used in the seed boxes. Soil for seed-beds may be sterilised by soaking it with formalin, and although such sterilisation is costly, it pays where much trouble is encountered with seed-bed diseases. One part of the commercial solution should be used to fifty of water, and about half a gallon employed to each square foot of the seed-bed. These preparations should be made at least a week before sowing, and in the interval the soil should be turned over thoroughly to enable the vapour to escape when it has done its work.

Lamb Marking Mortality.

There can be little doubt that a large number of lambs are lost annually as a consequence of neglect during and following the process of marking.

Every season a number of deaths are reported closely following the period in which the operation is usually performed. The fact that deaths always cease within a short time of the healing of the wound and start a short time after its infliction supports the assertion that they are generally traceable to one of the various diseases (notably tetanus, malignant œdema, septicæmia, and anthrax) capable of transmission by inoculation, the unhealed wounds providing the channel by which the infection reaches the lamb.

When marking small flocks, it is best to use temporary yards made of wire netting, situated in a fresh paddock. Where the size of the flock makes this impracticable, the surface soil of the yards should be removed to a depth of about 6 in., placed in a heap and thoroughly mixed with quicklime. The fresh surface should then be saturated with a strong solution of a non-poisonous sheep dip.

In addition to the above precautionary measure, it is essential to adopt some means of preventing the germs of disease from gaining entrance into the flesh-cuts made in the scrotum and tail. As the yards, although the main, are not the only source of infection, it is recommended that wounds of the scrotum and tail be either smeared with Stockholm tar broken down with kerosene or dressed with carbolised oil (1 part of carbolic acid to 12 parts of oil) before the lamb is released after the operation. This is most important.

Knives used for docking and tailing should be boiled, and not allowed to come in contact with the ground during use.

Lambs dead of any of the diseases mentioned, if not destroyed, form fresh centres of infection by absorption of the micro-organism by the earth. All carcases should therefore be destroyed by burning. Finally, if measures are not taken to prevent these diseases, the losses, in addition to occuring annually, will show a tendency to increase in extent by reason of the increased soil contamination.

Care of Cream—Some Necessary Precautions.

Do not blame the factory manager or the grader if your cream is put out of "choicest" class—look for the cause and remedy it. Here are a few ways in which quality may be safeguarded:—

Separate milk at blood heat as soon as you can after milking. Fix a cooler to the cream spout of the separator and so cool all cream—it will keep ever so much better.

Do not mix new cream with that from the previous separating until it has been cooled. Mix by pouring from one vessel to another. This allows the air to purify it and makes it keep better. For the same reason, stir the cream can frequently, using an enamelled stirrer—do not use wood.

Keep the cream can in a cool, draughty, well-ventilated place, and exclude flies. Keep the can covered with a piece of wire gauze fitted into a small, handy wooden frame. Do not allow the direct rays of sun to reach the cream.

When sending to the factory, fill cans to the neck rim; this prevents churning in the can, which would mean a loss in weight and an incorrect test.

Separate in the summer to get a 40 to 42 per cent. test, and in the winter to get a 33 to 36 per cent. test. When the cream is excessively thick there is a loss of fat in the skim milk. When it is too thin in the summer season it may become too sour, and curdled milk is formed. Do not use too much washings to get the last of the milk through the bowl. When separating, be very careful of three things—(1) Have the temperature of the milk over 90 deg. Fah.; (2) keep the speed even and bowl up to the specified revolutions; and (3) keep the inflow of milk to the bowl regular and full.

Keep cans of cream in the shade, especially when being carted or when waiting at the roadside for the cream van. A small shelter-box should be provided, high enough from the ground to be safe from dogs. Deliver cream to the factory daily if possible. The cream wagon or cart should have a cover to keep the sun's rays from the cans; even a 6-in. space between the top of the cans and the cover will be sufficient.

If you cannot improve the quality of your cream by the abovementioned means, ask the advice of the departmental dairy instructor in your district or of your factory manager.

Better Dairying—Clean Milk Conditions.

Clean milk competitions are a somewhat recent development of dairy life in England. The competitions appear to last for some time, for the custom is for the competing farmers to take routine samples of their milk at intervals and to dispatch them at regular intervals to the laboratory; but the county inspector, who usually acts as judge, makes surprise visits and takes samples for himself. These samples are tested for keeping quality, number of bacteria present, and degree of contamination by fæcal matter, while the butter-fat and visible dirt are also frequently ascertained. The animals, sheds, dairy, and methods of each competitor are examined and score-carded, and the inspector is frequently able to give a bit of instruction or to offer a hint as to some portion of the dairy, as well as to point continually to the value of thorough cleanliness.

Originally the custom was to publish a short report at the end of the competition, but it was found that competitors had a very keen interest in knowing how they were getting on, and the practice has been adopted of sending out interim reports at stages at which all competitors have submitted an equal number of samples for analysis. The reports give notes on the analyses and on the surprise inspections. No names are mentioned, but the code numbers (known only to the organisers and each competitor) are given, so that each farmer can pick out his own results. These reports are very carefully studied, all are enabled to profit by suggestions (and at the same stage in the competition), and much important information is disseminated.

The effect of the competitions has been a marked decline in the number of bacteria present in the samples from competitors, and a distinct increase in the period over which the samples of milk will keep sweet.

The Value of Maize.

Australia usually produces 1,000,000 bushels short of her annual requirements of maize, although possessing very much more than sufficient suitable soil to make up this shortage. Maize is one of the easiest crops to grow on good land, and both the grain and the fodder produced are among the most valuable feeding stuffs for practically all kinds of stock.

The value of the grain is well known for the topping of pigs for market, for poultry feed, for maintaining the stamina and warmth (particularly in cold weather) of horses doing arduous work, and for keeping sheep alive during periods of drought in the west, but its utility has not yet been realised sufficiently for topping lambs and steers for market as is done in America, nor do the excellent qualities of the grain as a concentrate for increasing the milk flow of dairy cattle seem to be appreciated thoroughly except by a few farmers in certain districts. For green fodder there is no crop better for stimulating the milk production when summer pastures are short, and maize unquestionably makes the best silage of any crop known. In certain districts (particularly those with cold dry winters) the utilisation of the crop for the dual purpose of providing both grain and fodder (stover) is becoming more general.

In general, it might be said that the true value of the maize crop will not be properly realised until it is utilised to a greater extent on the farm where it is grown. By combining maize-growing with live stock raising, but little of the actual crop need leave the farm. In the United States of America it is estimated that 90 per cent. of the maize that is produced is utilised in this way, that is, about 27 bushels per head of population. In Australia only about 2 bushels per head of population is used altogether, and probably less than half a bushel per head is utilised by feeding to live stock on the farm where it is grown.

Maize-growing can be made more profitable on the farm, firstly, by making more use of it as food for stock, instead of depending so much on the direct sale of the grain, and, secondly, by obtaining increased yields per acre. These are the only individual counters to a low market price, such as occurs at times when there is over-production in the country.

The yield of maize depends on the fertility of the soil, on the climate and season, on the inherent vigour and soundness of the seed, and on the cultivation methods adopted. Most important of the latter are deep early ploughing and winter fallow. Experiments at Grafton Experiment Farm averaged over four years showed winter-ploughed land to yield at the rate of 53 bushels 10 lb. per acre, as compared with only 41 bushels 40 lb. per acre from spring-ploughed land.

Pasteurisation of Milk—Processes Involved.

So much has been said about the pasteurisation of milk that the subject would seem to be well nigh exhausted, yet every now and then (writes G. L. A. Ruehle, in the Michigan Experiment Station "Quarterly Bulletin"), a remark is made which suggested that, although everyone is familiar with the name for the process, the process itself is not well understood.

What is pasteurisation? In the first place it should be understood that pasteurisation to-day and pasteurisation in the early days, when it first acquired its dark reputation, are not the same thing. In those days pasteurising meant heating the milk to a fairly high temperature, anywhere, say, from 165 deg. Fahr., to 190 deg. Fahr., for anywhere from ten to sixty minutes.

To-day, the term pasteurisation when applied to market milk means heating milk to 142-145 deg. Fahr. for twenty-thirty minutes. A further extension of the definition should include prompt cooling to 50 deg. Fahr., and proper safeguards to prevent reinoculation of the milk with undesirable bacteria.

The effect of pasteurisation upon the physical and chemical properties of milk has been the subject of much controversy. This was due to the differences in definition of the term pasteurisation. There is no doubt but that heating milk to a high temperature imparts a decidedly cooked taste, which is due to several factors—driving off of the natural gases of the milk, partial decomposition of the proteins, with the production of new compounds and caramelisation of the milk sugar. Highly cooked milk also is thought by many to be less digestible than raw milk, although there is still a difference of opinion among good dietitians on this point. High heat also causes a breaking up of the clusters of fat globules into independent fat globules which rise less readily to the surface than the larger clusters. This results in destroying the cream line. But milk pasteurised by modern methods does not have any of these objections to a noticeable degree. There is no evidence that pasteurised milk has any less food value than raw milk, with the exception that vitamine C is partially destroyed. This, however, is easily replaced in the diet by the use of fresh fruits (the juices of oranges, tomatoes, &c., for babies) and greens, so that there is no excuse for giving up the safety of pasteurised milk on account of its deficiency in vitamine C. For properly pasteurised milk is safe milk, while all raw milk is potentially dangerous.

The purposes of pasteurisation may be said to be two: first, the hygienic reason, for which the milk is made safe for human use, and second, the economic reason for which the keeping quality of the milk in enhanced.

Southern Sheep-Feeding Trials.

Requests that investigations be undertaken with regard to the provisions of additional food for ewes and lambs when the latter are intended to be marketed as fat lambs, led to the inauguration by the New South Wales Department of Agriculture recently of experiments which would afford some specific information. As practically no work of this nature had previously been undertaken in this country, and as conditions here, both as regards the raising of live stock and the growing of feed, differ markedly from those in countries in which experimental work has been carried out, it was necessary to commence with very simple experiments, in order to collect data on which to continue investigations. The first experiment was carried out at Bathurst Experiment Farm.

The trial was carried out with 150 ewes and their lambs, the plan being to run these on fodder crops and fallows during the day, and at night to draft them into three lots (each lot having been previously branded distinctively) for separate yarding; Lot 1 to be supplied with roughage and maize at the rate of 6 oz. per ewe, Lot 2 with roughage and oats at the rate of 6 oz. per ewe, and Lot 3 not to be hand fed. The feed was given in shallow bag troughs in the yard where the ewes were kept for the night, and the usual departmental lick was also supplied to each lot in the yards at night.

The trial was commenced on 22nd August, the lambs being then an average of seven weeks old. The ewes and their lambs were divided as follows:—Lot 1, 57 lambs and their mothers; Lot 2, 56; Lot 3, 51. For three weeks very little of the feed which was given in the troughs was eaten, and most of the roughage (straw chaff) was scattered about by the sheep. On account of this waste it was decided to dispense with the roughage and feed the grain alone. By the end of

September all the feed was being cleaned up readily. Very little difference in appearance could be noticed between one lot and another during the course of the trial, except that towards the end the lambs in the oat-fed trial had more bloom on them. The season was very favourable to the growth of the fodder crops, and green feed was plentiful up to the end of the trial. Throughout the trial all the sheep, both ewes and lambs, were in excellent health.

The average weights of the lambs at the start and three months later (3rd December), when it was decided to dispose of half of them, were as follows:—

Lot 1.—First weighing, 37.1 lb.; second weighing, 68.0 lb.; increase, 30.9 lb.

Lot 2.—First weighing, 42.7 lb.; second weighing, 74.0 lb.; increase, 31.3 lb.

Lot 3.—First weighing, 36.7 lb.; second weighing, 66.5 lb; increase, 29.8 lb.

The remainder, which comprised the younger lambs of the drop, were continued on the same ration, and were marketed on 22nd January. The average price realised at each sale and the combined averages were as follows:—

Lot 1.—First draft (27), 37s.; second draft, (30), 28s. 7d.; combined average price (57), 33s. 1d.

Lot 2.—First draft (33), 38s. 7¾d.; second draft (21), 28s.; combined average price (54), 34s. 10½d.

Lot 3.—First draft (28), 30s. 9¼d.; second draft (21), 29s.; combined average price (51), 29s. 1¾d.

The difference in price realised at the two sales was attributed to the facts that, on account of the pastures going off somewhat, the second draft were rather dry in appearance when sold, and that the lamb market on 22nd January was lower than usual.

As the full amount of the grain was not eaten, particularly at the beginning, the quantity was reduced, then increased gradually, so that the sheep just cleaned up the amount of grain given, the amount never exceeding 6 oz. per ewe. A record was kept of the total amount of grain given to the two lots which were fed. Lot 1 was fed 1,314 lb. maize at 5s. per bushel, total value £5 17s. 4d. for the 57 lambs. Lot 2 was fed 762 lb. oats at 4s. 7d. per bushel, total value £4 7s. 4d. for the 54 lambs. There resulted, therefore, the following figures:—

Lot.	Cost of Grain per Lamb	Average Value per Lamb.
	s. d.	*s. d.*
1	2 0¾	33 1
2	1 7½	34 10½
3	..	29 1¾

"The figures show," according to the report on the experiment, "an average added value for the lambs fed on oats of 5s. 8¾d., and for those fed on maize of 3s. 11¼d. over the lot which had no extra feed. As a matter of fact, in the case of the first draft fed on oats, the cost of grain per lamb works out at a little under 1s. 5d., while that for the second is about 1s. 11d. This will increase the advantage of the lambs fed on oats in the first draft to 6s. 5½d. above the lambs receiving no extra feed. In the case of the second draft the advantage is only 1d., which is a rather remarkable contrast. The first draft of those fed on maize cost just under 1s. 9d. to feed, and consequently show an advantage of 5s. 3d. over those not fed on grain. The second draft cost 2s. 4½d. in feed, and consequently there was a loss of 7½d. on this draft. The reasons for the marked difference in comparative values does not appear capable of satisfactory explanation, and the point will be carefully watched.

"The work entailed in drafting and putting out the feed each evening has not been considered in these results. Under ordinary conditions very little work would be necessary, as after about a week the sheep would come readily to the feed trough placed in the paddock.

"These results tend to show that extra feed in the shape of concentrates is of value in forcing the growing lamb. Feed given in this manner should be specially valuable if the season becomes dry, resulting in the green feed not being as succulent as it should be."

Benefit of Cultivation.

The benefit of cultivation for the conservation of soil moisture is emphasised by experiments carried out at the Dominion Experimental Station, Swift Current, Canada. It was found that stubble land, in the spring of 1924, contained only 1·18 inches of available water, while land summer-fallowed in 1923 contained 6·75 inches. Both soils were seeded to wheat and received 7·73 inches of rain during the growing season. In all, therefore, the crops received 8·91 and 14·48 inches respectively, yet the fallow land, with a 60 per cent. increase in moisture, produced three and a-half times as great a crop as that from the stubble land.

A Good Bull a Good Investment.

A great many farmers consider a good pure-bred dairy bull to be an expensive luxury —an animal that is very nice to have on the farm, but only an investment for wealthy men. This is quite wrong, points out E. W. Sampson, in the Journal of the South African Department of Agriculture. A good bull can earn more money than cows bought for the same sum. The better bred the cow is, the higher the profit she can yield if properly handled. If the farmer were to put a good bull to his cows and gradually replace the old stock by heifers that gave better yields than their dams, his extra profits would soon more than cover the cost of the bull.

But the money earned by the bull may be calculated in a more direct way than this. Suppose a farmer has thirty low-grade cows, and decides to improve his herd with a pedigree bull having good milk records on both his dam's and his sire's sides. Let us suppose that the low-grade cows are worth £10 a head and that the price of the bull is £40. It is reasonable to suppose that about twelve heifers will be reared per year. The value of these heifers at calving should be at least £3 per head higher than that of their dams, and this would mean that the bull had earned £36 on his first lot of calves.

Hoof Wounds—Treatment.

Wounds occur in horses' hoofs principally as the result of the animal treading on such sharp bodies as nails, wire, and pieces of iron or glass, which penetrate the soft structures of the foot. The horny sole is itself impervious, and such foreign bodies almost invariably enter through the frog, injuring the sensitive under-structures of that organ, and in exceptional cases the pedal or navicular bones.

The objects aimed at in treatment are to prevent infection, and to limit the spread of inflammation. The foreign body must be located and removed, and precautions taken against any particles being left behind, after which the wound must be well washed out with some antiseptic solution. If a nail has caused the injury, the track should be cut out until the injured soft structures are exposed, and the wound thoroughly washed with an antiseptic, such as lysol and water, and syringed out with tincture of iodine; it may then be packed with a dressing consisting of iodoform 1 part and boracic acid 6 parts, or with a saturated solution of iodoform and eucalyptus oil, and finally bandaged.

The wound must be dressed and bandaged daily until healing occurs. When the animal is fit for work, the sole should be smeared with tar, packed with tow, and a leather sole put on with the first shoeing to prevent any further injury to the old wound, which will then be only covered with a thin layer of horn.

Shaping Young Fruit Trees.

When pruning young fruit trees the main thing to keep in mind is the establishment of a good framework, and for the first few years of a tree's life it is advisable to cut the leaders well back.

The advantages of a good framework are many. The limbs can carry the weight of fruit, picking, spraying, and cultural work is facilitated, free circulation of air is allowed, and the sun's rays are permitted to penetrate, which is an important consideration for bud formation in the centre of the tree. When pruning young trees it is always advisable to encourage them to spread; spreading trees (but not so spreading as to impede cultural operations) are more easily handled than more upright trees. After a good framework has been developed, and if the tree is still making heavy growth, it would be advisable to allow it to go unpruned for a season. This will have the effect of inducing it to crop.

In pruning older trees, the characteristics of the various kinds and varieties must be taken into consideration. The pruner should remember that peaches crop only on the previous year's growth, and the older wood will not retain a permanent, self-replacing fruit spur like the apple and pear. In old apple or pear trees it is sometimes necessary to thin out fruit-bearing spurs or they become too crowded.

There is no hard and fast rule that applies to pruning—there are so many factors which influence the tree, such as soil, location, stock, and the treatment that the trees receive as regards spraying, cultivation, manuring, &c. Each tree of each variety must be treated individually, and given the particular treatment that will result in the greatest annual productivity of good fruit, and to do this work intelligently the habits and conditions of each tree must be closely studied.

Green Manuring Crops.

Among the most effective means of adding humus to the soil is the ploughing under of a green crop. The district and the conditions will largely determine the choice of crops for green manuring purposes, but farmers generally are not inclined to sow a crop which occupies the land too long unless it can be grown as a cover or companion crop, or unless it can be utilised partly for fodder purposes. An indication of the crops which may be chosen can be obtained from the following classification:—

Very Warm Moist Climates.—Spring or summer sowing: Velvet beans, sunn hemp, cowpeas, pigeon peas, dolichos beans, Florida beggarweed. Autumn or winter sowing: Field peas, vetches, clovers.

Warm or Temperate Moist Climates.—Spring or summer sowing: Cowpeas, dolichos beans, soy beans. Autumn sowing: Field peas, vetches, clovers.

Moderately Dry Climates.—Autumn sowing: Field peas, vetches, clovers.

Cool Climates.—Late spring sowing: Soy beans. Autumn, spring, or summer sowing: Field peas, vetches, clovers.

Only leguminous crops are included in the above in view of the superiority of the legumes for green manuring generally, but in some districts fodder crops which are non-legumes are sometimes grown for feed, and a little aftergrowth is sometimes allowed for ploughing in. This practice has some benefit in improving the tilth of the soil, but is not as good as the growing of legumes for increasing the organic matter and nitrogen in the soil. These crops are winter growing—rye, barley, oats, wheat, rape, mustard, &c.

Manuring of Orchards.

Interesting reference to the subject of orchard manuring is made by officers of the Fruit Branch of the New South Wales Department of Agriculture in the current "Agricultural Gazette."

That it pays to manure citrus trees, say the writers, is universally recognised in this State. On rich deep soil it may not be necessary for the first few years after planting, but later, when the trees have borne a few heavy crops, fertilisers are necessary to obtain maximum returns.

With deciduous trees generally, and with apples and pears especially, there is not nearly the same certainty of manuring paying on all classes of soil. On our very poor, light, sandstone soils the manuring of even young apple trees is necessary to obtain sufficient growth to build up a tree of reasonable size, and later to maintain sufficient vigour in the tree when it is cropping. Undoubtedly in these cases stable manure gives the most satisfactory results. An instance is also known where old apple trees on rich deep soil were restored to vigour and profitable cropping by heavy applications of stable manure. It seems feasible that in such cases the results obtained are to some extent indirect, in that the stable manure has improved the condition for soil bacteria, and has also improved the capacity of the soil for retaining moisture. At the departmental orchards at Bathurst and Glen Innes, the first on a granite country and the latter on a heavy basalt soil, experiments in manuring of apples have completely failed to show any result. At the latter place the experiment is being continued.

It is interesting to note that similar results have been observed in the United States. Bulletin No. 516, published by the New York Agricultural Experiment Station, under the title of "Twenty-five Years of Fertilisers in a New York Apple Orchard," in giving results over the period mentioned under a system of clean cultivation, and non-leguminous cover cropping, states that "the application of fertilisers has resulted in no consistent differences either in total yield of fruit, size, colour, date of maturity, flavour, texture, or keeping quality." Besides dealing with the results from the twenty-five years' experiments, a summary of reports from other States regarding fertiliser applications in apple orchards is given in the Bulletin, which concludes the matter as affecting apples thus:—

"In general it can be said from these results reported from different sections of the country, contradictory as some of them may seem, that fertilisers are, in the main, held to be of value on thin or worn-out land, or in orchards which are making weak growth. At the same time well-cared-for orchards on good land, under proper conditions of clean cultivation and cover cropping, show little favourable response to fertiliser applications.

"If sod orchards were to be considered in this connection, it would be apparent at once that there is hardly a single exception to the general rule that sod orchards respond markedly to nitrogenous fertilisers."

Mouse Infested Buildings—Fumigation.

Replying to a recent inquiry as to whether fumigation was advocated as a means of ridding of mice a concrete store containing maize and chaff, the Entomologist of the Department of Agriculture of New South Wales stated that the method could be recommended as effective. Care must be taken, however, to make the store reasonably gas-tight by plugging up or pasting slips of paper over all windows and cracks and finally sealing the door in a similar manner. Either of the following methods could be advised:—

Fumigation with Carbon Bisulphide.—This should be used at the rate of 10 lb. per 1,000 cubic ft. of space. The carbon bisulphide is simply placed in saucers or other shallow receptacles, preferably near the ceiling, and the door closed and sealed as described. The building should be allowed to remain closed for twenty-four hours.

The chief disadvantage of carbon bisulhpide is that it is highly inflammable, and no light of any sort (neither pipes or cigarettes) should on any account be allowed in the vicinity during the process of fumigation.

Fumigation with Hydrocyanic Acid.—This is a very satisfactory fumigant for work of this kind, but the gas itself and the potassium cyanide solid from which it is generated are extremely fatal to all life, including that of man, and great care must be exercised in handling it. On no account must the building treated be entered during the process of fumigation or until it has been properly aired after fumigation is completed. Arrangements should be made for opening the building from the outside after fumigating, and nobody should be allowed to go near it until all the gas has been dispersed. The gas is generated by the inter-action of potassium or sodium cyanide and sulphuric acid, 1 oz. of potassium cyanide and 1 fluid oz. of sulphuric acid being used to each 100 cubic ft. of space. The process is as follows:—

Divide the cyanide into two or more parts (according to the quantity of it to be used) and place in brown paper bags tied with string. Divide the acid in the same way, and then mix each separate lot of acid with three times the quantity of water; thus, 1 oz. of sulphuric acid would be mixed with 3 fluid oz. of water. In mixing, pour the acid gradually and slowly into the water, not the water into the acid. The acid and water can be placed in kerosene tins, pitched or paraffined inside, or other receptacles, such as earthenware pots if available. The bags containing cyanide are then placed in the acid, commencing with the tin farthest away from the door. Immediately this is done, leave the building, and carefully seal the door to prevent any fumes from getting out.

Notices should be placed in conspicuous places on the outside of the building as to the dangerous nature of the fumigant inside. The period of fumigation should be from twelve to twenty-four hours, the charge being placed in the building late in the afternoon and the latter opened up the following morning. In opening up the building, the operator is especially warned not to enter it or to breathe any of the gas; doors, windows, or ventilators should have been left in such a manner that they can be easily opened from the outside, and the fresh air allowed to enter for several hours before any person has access.

Meat Meal for Poultry—Southern Feeding Experiments.

At the conference of poultry farmers held at Hawkesbury Agricultural College in July last year it was announced that the next set of feeding experiments to be carried out there would be on ratios, and that these would be commenced in the spring of that year. In accordance with this announcement 160 pullets were penned, divided into four lots of forty each, which were again subdivided into twenty each, two twenties being regarded as one unit for the purpose of the experiment. Since the ratio fed would depend upon the quantity of meat meal or concentrates used in connection with the other constituent articles of the morning mash, it was decided that it would simplify the experiment if it was arranged in terms of the quantities of meat meal used daily for the different lots.

The following was the morning mash fed to each section, in conjunction with a grain ration of two-thirds wheat and one-third maize for the evening meal:—

Pens 1 and 2.—Pollard, 66⅔ per cent.; bran, 33⅓ per cent.; meat meal, nil.

Pens 3 and 4.—Pollard, 65 per cent.; bran, 32½ per cent.; meat meal, 2½ per cent.

Pens 5 and 6.—Pollard, 63¾ per cent.; bran, 31⅜ per cent.; meat meal, 5 per cent.

Pens 7 and 8.—Pollard, 61⅜ per cent.; bran, nearly 31 per cent.; meat meal, 7½ per cent.

The experiment was conducted over the flush period of laying—September to March inclusive—so that it has a direct bearing and value in connection with the question that was being debated at the time—the necessity of feeding meat meal or concentrates during the summer months.

The total yields per lot of forty pullets for the period and the average number of eggs per hen were as follows:—

Meat meal.	Eggs.	Eggs.
None	3,643 ..	91
2½ per cent.	3,686 ..	92
5 per cent.	4,265 ..	106.6
7½ per cent.	4,145 ..	103.6

The table shows that as between the group fed on 2½ per cent. meat meal and none at all there is a difference of 43 eggs in favour of the former, but as between the group fed without meat meal and that receiving 5 per cent. there is a difference of 622 eggs, or almost 52 dozen eggs in favour of feeding meat meal on that basis. The lots fed 7½ per cent. meat meal actually gave 120 eggs less than the 5 per cent. group.

A close observation was kept as to the condition of the birds during the experiment, but it was not until February that there was any noticeable disparity between the various groups. In that month the no-meal and the 2½ per cent. meat meal groups were seen to be falling off in condition, compared with the two groups receiving 5 and 7½ per cent. meat meal respectively. During the whole of March there was a marked difference in the health and condition of the two latter groups as compared with the two former, in so much that they were standing the strain of the moult much better. In the no-meal section, in particular, there were distinct signs of fag.

A calculation shows that the forty birds in the 5 per cent. meat meal section consumed meat meal to the value of 9s., but they produced two short of 52 dozen more eggs than the no-meat group, the value of which was £3 16s. 3d. The profit on meat feeding on the 5 per cent. basis was thus £3 7s. 3d. This, in conjunction with the better condition of the birds at the conclusion of the test, shows the value of meat feeding over no-meat feeding to be of considerable importance. M.I.B. meat meal was used in the test.

This seven months' experiment having been carired out over the warm part of the year, and the results being so remarkable, it was decided to carry out another test over the full twelve months. From this experiment, which commenced on 1st May, it is expected that valuable data will be obtained on points such as egg production, behaviour of the birds in respect of moulting, &c.

What the Farmer Owes to the Scientist.

One often hears from a farmer that such and such an investigation is not practical, that it will not lead to useful results, that it is a waste of time and money. Sir Robert Greig points out in the "Scottish Journal of Agriculture" that this is a natural but a short-sighted view. It is natural because a farmer, who makes his living by applying science to his industry, wants to see how he can make an immediate increase of profit or avoid a loss. It is short-sighted because all applied science is the outcome of pure research.

If all scientific men were to devote themselves to the application of the results of research, and to ignore pure research—*i.e.*, research without a practical object—the increase of knowledge would immediately be curtailed, and applied science would suffer accordingly. It is easy to cite examples of the practical benefits resulting from pure science. Researches upon the comparatively unimportant metal, selenium, have shown the probability that through its reaction to light rays the blind will in future be able to read by sound a book in ordinary type, instead of being compelled as now to read clumsy and expensive embossed type by touch. Yet it is probable that nothing was further from the mind of the researcher than that this extraordinary benefit to the afflicted would come out of his research. In Canada competent authorities estimate that hundreds of millions of dollars have been added to the wealth of the world by the introduction of Marquis wheat. It may be said that Marquis wheat was the product of an agricultural experiment station, and so it was; but it was the fundamental knowledge of pure science, the science of botany, which enabled the investigator to produce Marquis.

It is true that the gains from research for its own sake are more numerous and spectacular in public health and in naval and military science than in agriculture. It is also true that some of the discoveries which have benefited agriculture have been due to empirical experiments, such as the use of basic slag on suitable land or the inclusion of wild white clover in grass-seed mixtures. But this is no argument for the neglect of pure science; rather it is an encouragement to attack the fundamental principles which lie at the roots of our farming methods, and without regard to immediate results, to believe that at any moment a great discovery may be made.

Let not the farmer regard too lightly or contemptuously the man of research. It may be that some obscure investigator, after years of apparent failure, will supply the piece that enables the scientist in Vienna or California to complete the pattern which as a whole will shake the world with a new idea. It is true at all events that in different parts of the world there are men working at questions of heredity and sex determination on snails or frogs or monkeys with no thought of the stockowner's problems, nor any interest in them, but building up such a body of knowledge that one day the breeder may breed colts or fillies, bulls or heifers, just as he may determine.

A little consideration will show that our present research institutions are based upon, and could not exist without, the foundation of pure science. An investigation of the mineral requirements in the food of animals could not be undertaken if the pure chemist had not long ago, and without any regard for results, discovered the inorganic composition of the earth and the actions and reactions of its elements. But his knowledge would have been useless at this stage if the physiologist had not demonstrated the circulation of the blood and the processes of digestion and respiration. It is only in the light of such knowledge that it is worth while to ask such a question as what foods and combinations of food will produce the most rapid and healthy growth in an animal.

Without the physicist the experiments which are being carried out to-day on the effects of light upon growth would be impossible, and the hope now held out that the rearrangement of buildings and the judicious use of artificial light will add to the health and productivity of domestic animals would be unfounded.

The classification of soils into their superficial chemical and physical types is the result, within the last century only, of the work of the geologist, the chemist, and the physicist. A soil survey for the information of the farmer cannot be undertaken without a knowledge of, and a reference to, the discoveries of men who had no practical end in view, but only the craving to know.

Many of the new varieties of our farm plants are due not to agricultural experts but to Mendel, a priest who occupied his leisure by growing peas; De Vries, a professor of botany, who experimented with marigolds and primroses; and Nilsson, a botanist who knew nothing of farming. These men blazed the trail, and our plant-breeding stations, from which, especially in Canada and Australia, such marvellous economic results have been reaped, are the outcome of pure research.

Levy on Sugar-cane Growers—Farleigh, Cattle Creek, and Pleystowe Mills.

Additional Primary Producers' Levy Regulations for 1925 have been issued, empowering, on conditions mentioned below, the Mackay District Council to make a levy on sugar-cane growers in localities and at rates as follows:—

(*a*) Lands situated on the north side of the Pioneer River and assigned to the Farleigh Sugar Mill—2d. per ton of sugar-cane delivered to Farleigh Mill.

(*b*) Lands assigned to the Cattle Creek Sugar Mill—2d. per ton of sugar-cane delivered to Cattle Creek Mill.

(*c*) Lands assigned to Pleystowe Sugar Mill—1½d. per ton of sugar-cane delivered to Pleystowe Mill.

Such levies to apply to the period 1st June, 1925, to 28th February, 1926.

The above levies will be made, however, only on the following conditions:—

If at least 100 sugar-cane growers in any of the localities abovementioned, on or before the 24th August, 1925, make in writing to the Minister a request for a poll on the question of the levy proposed to be made, a poll of all growers concerned shall be held, and if the majority of votes is against the making of the levy the levy shall not be made.

The amount of every such levy shall be deducted by the manager of the mill concerned from the cane payments due by each mill to sugar-cane growers concerned, and shall be paid by him to the Mackay District Council for utilisation for the purposes of the Check Weighmen's Association of such mill.

A penalty of £5 is provided for any breach of these Regulations.

Feeding the Dairy-Bred Calf.

While good breeding is essential to success in stock-raising, the best of breeding may become of little value if the young animals are not properly raised. This is particularly true of the dairy-bred calf. The young of practically all other classes of stock are reared by their dams in the natural way, and so long as the dam is well fed and proper housing is given, the young are assured of a good start in life. Not so with the dairy calf. In the majority of cases, and certainly in all cases where economy is any consideration, the calf is taken from its dam when a few hours, or days, old and reared by hand. The efficiency of the method of hand-feeding followed has much to do with the ultimate size, strength, and usefulness of the animal.

At the Central Experimental Farm, Ottawa, a fairly successful system of calf feeding has been developed, as a walk through the calf barn at any season, but particularly at this season of the year, will demonstrate. Moreover, the system followed is not one that is so intricate and so costly that the average farmer cannot follow it.

For the sake of brevity, it is outlined in the following table:—

DAILY RATIONS IN CALF FEEDING.

Age of Calf in Weeks.	Whole Milk.	Skim Milk.	Fat Substitute in Skim Milk.	Dry Meal.
	lb.	lb.	lb.	lb.
0– 2	8—12	..	..	..
2– 4	10—12	..	..	..
4– 6	7	7	0—$\frac{1}{16}$	0—$\frac{1}{4}$
6– 8	..	14	$\frac{1}{16}$—$\frac{1}{4}$	$\frac{1}{4}$—$\frac{1}{2}$
8–12	..	14	$\frac{1}{4}$—$\frac{1}{2}$	$\frac{1}{2}$—1
12–16	..	14	$\frac{1}{2}$—1	1—1$\frac{1}{2}$
16–20	..	14—12	1	1$\frac{1}{2}$—2
20–24	..	12—0	1—0	3

The above table outlines the system followed. A little amplification, however, will not be amiss. In the first place, if the calf is not left with the cow a day or more, so that it may get a proper feed of the first milk or colostrum, nature's bowel regulator, then care is taken to see that it gets a feed or two of this milk by hand. It is then continued on its dam's milk as long as possible. If for any reason its dam's milk is not available, then milk from another comparatively fresh cow is used. Care is taken to avoid overfeeding; small quantities being given three times a day at start rather than overloading the calf's stomach at greater intervals.

All changes are made gradually, reducing rather than increasing the amount given, while a change is being effected.

The temperature and freshness of the milk fed and cleanliness of the pails used are extremely important factors in successful calf feeding. Milk should be as near blood heat as possible and all pails should be scrubbed out after each feeding and not be left as a feeding place for flies.

As regards a fat substitute to be fed with the skim milk, there are several commercial calf meals on the market which have been tried out with fair success in most cases. If used, the manufacturers' directions for feeding should be followed. It will usually be found, however, that the commercial calf meals are unnecessarily expensive when an equally satisfactory calf meal can be mixed up at home at much less cost.

The home-mixed fat substitute used at the Central Experimental Farm is finely ground oats 2 parts, corn meal 2 parts, and ground flax seed 1 part, plus one-half per cent. salt and 1 per cent. bone meal. Where corn is difficult or impossible to obtain, results practically equal may be obtained if the amount of corn in the ration is reduced and more oats, preferably with hulls sifted out, is used in the mixture in its place, as corn is a fattening rather than a growing food. This is particularly true where there is any tendency to beefiness in the calves being fed. There is no

substitute for the ground flaxseed, but where it cannot possibly be obtained, 2 parts ground oil cake may be used to take its place.

This mixture is fed by putting the necessary amount, for a day's feeding for a lot of calves, in a pail and pouring scalding water over it, then mixing it up thoroughly. This is done in the morning and the mixture is fed that night and next morning in the milk.

The calves are started on the dry meal ration as soon as they will start to eat it. This consists of bran 3 parts, oats 2 parts, and oil cake meal 1 part. The only other feed they have is good alfalfa or clover hay, of which they get all they can eat.

At five months of age, the skim milk and fat substitute is removed from the ration, though it might well be continued if skim milk were plentiful. At this time the dry grain ration is increased and ensilage is given in small quantities. The dry grain ration is kept up until the animal is a year old, by which time it is so well developed that it will go on and do well thereafter on good pasture or silage, clover hay, and straw. The above outline of Central Experimental Farm methods is for fall and winter calves. In the case of summer calves, they are kept indoors until they are three or four months of age and then turned out at night time only in hot weather, and in day time only later in the season.

Where skim milk is lacking entirely, whole milk should be fed for a longer period—*i.e.*, at least eight weeks—gradually decreasing the amount fed and replacing with water, at the same time increasing the amount of calf meal, giving even more than the maximum outlined in the foregoing table. In such cases, the percentage of bone meal in the calf meal might well be increased to 3 per cent. to make up for the loss of mineral matter through not receiving skim milk.—Geo. W. Muir, Chief Assistant, Animal Husbandry Div., Canada, in "Seasonable Hints."

Principles of Hay-Making.

The aim of the farmer in this matter is to obtain for the feeding of his stock the largest weight per acre of palatable nutritious dry matter; to this end the crop must be cut when its principal components (grasses or clovers) have arrived at such a stage that the maximum yield or weight of hay per acre will be attained without material impairment in composition or digestibility having taken place. If the crop is cut too early the maximum weight of hay will not be obtained; if on the other hand it is left uncut until the final stages of ripening have set in, the nutritive value of the resultant hay will be distinctly lowered. This latter is by far the more serious fault, for as the plant ripens it loses rapidly in the most of its valuable nutrients, viz., protein, and, in digestibility, due to the woody character of the crop becoming more pronounced. For example, taking the case of timothy we have the following data:—

Timothy Hay (15 per cent. water).

Stage of Growth.	Protein.	Fibre.	Per cent. of Dry Matter Digestible.
	Per cent.	Per cent.	
Seeds formed	14·27	24·16	59
Seeds, fully ripe	6·98	25·95	52

These figures clearly show the great loss in protein, the increase in woody fibre, and the lowering of the digestibility of the hay which result from allowing the crop to become ripe before cutting. We therefore strongly counsel beginning the haying operations at or shortly after the flowering period, so that cutting may be completed before the seed is fully ripe.

In curing the grass to hay, rough handling and frequent manipulation should, as far as possible, be avoided, since such lead to loss of the finer and more nutritious portions—leaves and small stems.

The best cured hay results from a fairly rapid drying; though sunshine is the chief contributor, wind is a factor of no mean importance. If the day is sunny and breezy curing in the windrow or swath may be sufficiently thorough to reduce the moisture content to a safe limit and at the same time yield a fragrant hay with much of its original green colour.

Of course, hay which is perceptibly moist or damp to the touch—owing to insufficient drying or rainy weather—should not be stacked or put in the mow, since such will readily heat. Damp hay is liable to spontaneous combustion, and no doubt has been the cause of the destruction by fire of many barns with their contents.—Frank T. Shutt, Dominion Chemist, in "Seasonable Hints" (Canada).

Pedigree Breeding and Progeny Testing of Poultry.

Practically all pedigree work in poultry-keeping hinges on the trapnest. It is possible to get good results by keeping the hens in single pens, as is done in Australia and New Zealand, but the cost of housing makes the trapnest more practical in this country.

By marking each egg as it is taken from the trapnest with the number of the hen which laid it, these can be hatched separately. This can be done either under hens, by setting only the eggs from one dam under each hen, or in incubators. In the latter the eggs are handled in the ordinary way until the eighteenth day, when they are separated and each hen's eggs are put in wire containers. These can be bought or made at home—corn poppers are frequently used—or baskets can be made with mosquito netting or more open wire, about 4 in. high and of a size to suit the number of eggs being hatched. In all cases the baskets should not be filled too full, as the chicks when hatched and the empty shells take more room than the eggs. Pedigree hatching takes more incubator capacity than when the eggs are hatched in the ordinary way.

When the chicks are taken from the incubator each one is marked with a numbered band and a record kept of its parentage. These bands are usually wrapped on the leg and left there until the chick is about three weeks old, when they are transferred to the wing, but some breeders use a very small band and insert them in the wing at a day old. With this information the breeder gets the pedigree of these birds, and each year of this work gives him a more extended pedigree for his cockerels and pullets.

Pedigree hatching is being done on such an extensive scale to-day that no poultry-keeper who is anxious to improve his stock should use a male in his pens that is not pedigreed. If he is not trapnesting himself he can avail himself of the other men's work by buying a pedigreed cockerel. Selection by external characteristics is a very valuable help in selecting females, but considering how much is involved and how much the production of a flock might be reduced by using a son of a poor producer, a pedigreed cockerel is a sound investment.

Pedigree work can be carried a step further by the breeder who is trapnesting, and it is a long step too, but one which is neglected by many—this is progeny testing, particularly as regards the males. How many times has a breeder realised what wonderful pullets a mating has given him only after the male at the head of the pen has been killed or disposed of. "Swat the rooster" is a good slogan, where no intelligent breeding work is being done, but is responsible for the loss of some very valuable birds. By keeping over every male which has given good hatching results, until such time as his daughters have been tested out for vitality, production, size of egg, &c., it may be possible the next spring to mate up pens headed by males which have proved their ability to throw satisfactory producers. Some money may be wasted in keeping over birds for nearly a year only to be slaughtered in the end, but if only one good bird is discovered in this way it will more than offset that loss.

Tabulate all pullets from one hen, then all those from the next hen in the same pen, and so on until the progeny of that pen is all entered. Mark in the egg production of these pullets month by month, the size and quality of the egg, freedom from disqualifications, weight of bird, and any other particulars that will help you in the ideal you are striving for. By comparing and averaging up all the progeny from each sire and dam in this way you can see at once just what these parent birds have done for you, whether to put them in your breeding pens and just what you can expect from them if you do. As the winter months are most important, a good idea of the value of any particular bird can be obtained through its progeny before the next breeding season. The probable value (as breeders) of cockerels can also be arrived at by the performance of their sisters.—H. M. GREENWOOD, Exp. Fm., Agassiz, B.C.

Inexpensive Herd Testing—A Simple Method.

For many years the question of bringing about a universal system of testing dairy herds has agitated the minds of dairymen and the Departments of Agriculture and been keenly discussed at gatherings. No apparent progress of a general character has been made. Herd testing societies now going well are excellent in their way as far as they reach, but how limited they are—only touching a very small percentage of the dairy herds of the States, due to the expense of organising and operation. Everyone agrees that a fairly close knowledge of the milking capacity of each cow in a dairy herd is necessary in order to cull out the worst and bring about general improvement. There are unprofitable cows in every herd which has not been subjected to some system of culling, and these should be discovered so that they may be

fattened for slaughter. So far the main hindrance to the testing of ordinary herds has been the expense of testing the milk samples. That has been the bar to the individual farmers testing their own cows. Although simple to perform, the working of the Babcock test is often regarded as a "fiddling job," which does not appeal to many people, and farmers will not do it in the bunch; but an alternative method which should suit all but those who are actually indolent is here presented. The writer has had some experience in testing and is strongly in favour of complete testing in all its features as practised by the herd testing societies, but as this is at present impracticable for all the herds of the State, a method is submitted that could be put to a great deal of practical use in the meanwhile in culling "wasters" from the herds.

We shall suppose that the average production of our regular dairy herds is about 150 lb. butter fat per year, which would represent 400 gallons of milk at 3.8 per cent. test. The average test of ordinary dairy cows is certainly less than 4 per cent. of butter fat. Experience in testing ordinary herds of cattle show that farmers could not at present afford to cull out cows giving over 200 lb. butter fat in the season, and at 3.8 per cent. test these would be 500-gallon cows. This, therefore, may be safely set as a minimum milk yield for profitable production in the ordinary dairy herd. If they are breeding regularly it is only the extra good cows which will give milk in any quantity over nine consecutive months. The cow which will come in giving 25 lb. milk per day, and holding to that quantity for four months of her flush, does not drop off faster than 10 gallons per month afterwards, will pass the 500-gallon mark in even eight months lactation period. No dairy farmer will say that 2½ gallons milk is too heavy a yield to expect from a fair average cow on ordinary spring pasture; but when this standard is reached it will be found that there are large numbers of cows which fall very far short of this quantity.

It has been found that by weighing the milk from each cow in a herd at both milkings on a regular day in each month an estimate of the whole month's yield can be made, which is accurate enough for farm testing, so the work of checking the yields of the cows throughout the year resolves itself into a very simple matter. With the weight of each bucket marked on it the weighing and recording of each cow's milk is quickly put through, and yet the result will enable the owner to see which of the herd are giving a fair return for the grass they consume in comparison with the rest. If a closer record should be desired let the weighing be done weekly instead of monthly, although the latter period serves the purpose practically.

The outcome of starting on such a system as this is easy to foresee. Once the owner realises the great difference in the production of cows he is very likely to investigate further as to the quality of their milk, and will either get a tester for his own use or move to form an association which will assist to get the work done for him. In most cases where such a start has been made there follows further progress, but, as stated, it has been the expense of the taking of samples and testing them for quality which has held up the whole scheme.

This rudimentary system, if put in force by the farmer, would be making a start at the important and payable object of knowing and getting rid of the duffers in his herd, but his ultimate aim should be to get joined up with a recognised testing association so that his paying cows would have the privilege of receiving a certificate or "diploma" of efficiency.

There are many milk recording societies in England and Scotland working on the gallon yield only, and there is ample evidence in both the Government and district herd testing work done in South Australia to show that very great progress has been made, and following the above system would further assist in the general betterment of our dairy herds.

Agricultural societies might well assist in pushing this proposition. The few district testing associations that have been established in the State to date and the comparatively small number of dairy farmers who are members of those societies is proof that something more simple is required in laying the foundation of dairy cattle improvement. The extreme simplicity of this method of trying out the cows should appeal to everyone who desires to see the State's average dairy production take a definite upward tendency. On the basis stated no 500-gallon cow will be found unprofitable, while a cow will require to be something better than ordinary in test to make a profit if she gives a lower gallon yield. The work of milk recording when once started will quicken interest of the farmer in his herd. It will more especially concentrate interest or attention on the short-term milkers which in instances give a big flush flow, and then dry off quickly; these are often in the majority. Unquestionably a very great amount of good can immediately result from the iauguration of milk recording by the farmers of the State.—J.D. in "The Garden and Field" for June.

Importation of Second-Hand Sacks.

The Minister for Agriculture (Hon. W. Forgan Smith) has announced that he has received advice from the Director-General of Health, Melbourne, to the effect that it has now been decided to permit the importation into Australia of second-hand jute bags from Great Britain. The prohibition against the bringing into the Commonwealth of second-hand jute bags from the United States of America or any other country in which Foot and Mouth Disease is known to exist still remains in force.

Spraying Weeds on a Banana Plantation.

"My son has a dairy farm on the Richmond River and has put in about 8 acres of bananas in the very rocky high land at the back of the block. They are greatly troubled with weeds, which it is very difficult to deal with by chipping, as they grow in the cracks of the rocks. They have been advised to spray with arsenite of soda or one of the advertised weed-killers, but I am doubtful as to the effect on the bananas. Would you be good enough to give me your opinion?"

The writer of the foregoing was informed that the practice of destroying weeds in canefields by spraying with a solution of sodium arsenite had been successfully used in Hawaii. In one case land was sprayed for five years for weed destruction at the rate of three applications per year, using 5 lb. arsenious acid per acre for each application. The results obtained indicate that no fear need be entertained regarding any detrimental influence on organisms upon which the plants rely for nitrogen, provided proper soil texture is maintained. It was also found that the arsenic practically lost its toxic influence towards plants.

The reply added that if it was intended to attempt weed eradication on a banana plantation the arsenical spray should be applied to the weeds only, care being taken not to spray the banana plants as well. It appeared doubtful, however, whether small amounts of fine spray falling on the stems of adult banana plants would seriously injure them.—A. A. Ramsay, Chemist, N.S.W. Dept. Agr.

A Cure for the Self-Sucker.

One of the most perplexing problems confronting dairy farmers is the occasional bad habit developed by cows of sucking themselves. Where a large number of dairy calves are raised on skim milk they quite frequently acquire the habit of sucking their stable mates, and often this habit is continued until maturity.

There seems to be no good explanation as to why cows should suck themselves, and it is equally true that in the past there has been no satisfactory method of curing or preventing this bad habit. Various types of muzzles have been suggested, certain types of yokes have been tried, sticks have been attached to halters and passed down between the front legs of the cow and attached to a belt, with the idea of preventing the cow from getting her head back to the udder. Most of these devices have, however, proved ineffective or inhumane, and sooner or later the cow with this habit finds her way to the butcher's shop as the only positive and permanent cure.

Veterinary surgeons in the United States of America have tried an operation which consists of removing a part of the side and end of the tongue, but this has not been very satisfactory.

A simple device in use on the farm of the Georgia State College of Agriculture appears to be 100 per cent. efficient in curing the habit, and it is very inexpensive and simple to use. Take a piece of ordinary ¼-in. pipe about 6 in. in length; put a ring in each end like an ordinary bridle bit. Ten or twelve 1-in. holes are then bored through the pipe in every direction. This hollow bit is put into a halter, or device similar to a bridle. It has been found best to use a nose band on the bridle so as to hold the bit securely in place.

In order for the cow to draw milk she puts her tongue around three sides of the teat and presses it against the roof of her mouth. When she sucks she tends to produce a vacuum. With the hollow bit across the tongue, air is admitted from the ends, and it is impossible for her to draw milk, since she cannot form the necessary vacuum. After a few trials the cow soon learns that she cannot suck and soon stops trying. Nor can she suck other cattle.

The cow eats and ruminates normally with the hollow bit in her mouth. However, it is impossible for her to drink unless the water is deep enough for her to submerge the ends of the pipe.—"Live Stock Journal," England, 14th November, 1924.

Dairy Produce Regulations.

Regulation 144 of the Dairy Produce Act has been amended. This Regulation deals with milk supplied to cheese factories. Such milk must be tested by the Babcock or other method approved by the Minister. Payment for all milk received at a cheese factory must be made upon the basis of the grade and the butter fat content thereof. In estimating the weight of milk, the commercial gallon of milk shall be deemed to contain 10 lb. avoirdupois. The following forms have been added to the list of forms provided in connection with the Regulations:—Application for the Renewal of Registration; Certificate of Renewal of Registration; Particulars of Inspection; Monthly Milk Statement.

Cotton Seed.

The Minister for Agriculture and Stock (Hon. W. Forgan Smith) announces that the issue of cotton seed for planting in the coming season is proceeding satisfactorily. The agents for the distribution are the British Australian Cotton Association, Limited, and the seed is being distributed from the three ginneries—Whinstanes, Gladstone, and Rockhampton. Before issue the seed is fumigated in a Simon's heater to ensure protection against Pink Boll Worm. Mr. Forgan Smith adds that it is satisfactory to note that up to date seed for more than 15,000 acres has already been applied for, and with the exception of that required for less than 200 acres it is all Durango, which is a sign that farmers appreciate the value of a high-quality cotton.

Pamphlets for Pig Raisers.

Pamphlets on Pig Raising, listed as under, may be secured gratis on application to the Department of Agriculture and Stock, William street, Brisbane. Application may be made personally or by letter at any time:—

The Dentition of the Pig; Weaning the Pig; Feeding Pigs—Feeding Problems; The Berkshire Breed, Litter Records; Concrete Feeding Floors; Mineral Mixtures for Pigs; Pure Bred v. Mongrel—a Striking Contrast; Diarrhœa or White Scour in Pigs; Paralysis of the Hindquarters in Pigs; Pig Breeding, Root Crops for Pigs; A Peculiar Disease Affecting the Ear of Pigs; Early History of the Pig; Gestation Chart for Pigs; Selecting the Boar—Points Worthy of Note; Farm Bacon Curing; Marketing Pigs in Queensland; *Various Breeds of Pigs; Queensland Hams and Bacon; The Australian Stud Pig Breeders' Society; Maize for Pigs; Pig Clubs for Scholars—School Pig Clubs; *Plan and Detail of Movable Hurdle for Pigs; and several other pamphlets.

*In course of preparation.

Dairying Losses from Underfeeding.

The appended remarks on the subject, extracted from a recent address by the Dairy Expert of the New South Wales Department of Agriculture, are worthy of study by every dairy farmer. Following a review of the past season, and a comparison of the quantity of butter produced with that produced in seasons when feed was less plenteous, the speaker said:—

"The low average production yields of the dairy herds of Australia are not brought about so much by the poor quality of the cattle as by the inadequate food that is given them. . . . Taking the average production capacity of a cow for 365 days in a bad season to be 120 lb. butter, and in a good season to be 230 lb., the difference would be 110 lb. each cow. This at 1s. per lb. would represent £5 10s., or at 1s. 3d. per lb. £6 17s. 6d. Calculating that there are some 700,000 cows in registered dairies, it will be seen that at 1s. per lb. the loss made by the whole of the herds throughout the State owing to the difference of feed between a good and a bad season would amount to £3,850,000. At 1s. 3d. per lb. for butter, this loss would amount to slightly over £4,800,000. This demonstrates what good feeding does to the present class of New South Wales dairy stock, and the average yield put up during the past year shows that our dairy herds compare favourably with those of most other countries *if they are fed*. Taking the difference between the average production in a medium season and in a bad season, giving each cow a full 365-days production period, it would work out at £1 10s. per head with butter at 1s. per lb., or £1 17s. 6d. per head with butter at 1s. 3d. per lb. For the whole of the herds throughout the State, this would mean a loss of £1,000,000 owing to bad feeding conditions when butter is 1s. per lb., or £1,300,000 when butter is 1s. 3d. per lb."

Staff Changes and Appointments.

Mr. F. W. Haynes has been appointed as Inspector, Agricultural Bank, at Atherton.

The Police Magistrate, Charleville, has been appointed Government Representative on the Charleville Dingo Board.

Mr. J. G. Low, Winton, has been appointed a part-time Inspector of Slaughterhouses.

Mr. C. R. W. H. Lloyd, junr., of Rockhampton, and Messrs. G. Brown, H. W. Anning, A. J. Thompson, and R. S. Black, of the Royal Queensland Golf Club, have been appointed Officers under and for the purposes of the Animals and Birds Acts.

Mr. G. M. Watt, of Charters Towers, has been appointed an Honorary Inspector, Diseases in Plants Acts.

Constable J. J. Gallagher, of Turn-off Lagoons, has been appointed an Inspector of Slaughterhouses.

Mr. D. K. Paine, a member of the Brisbane Golf Club, has been appointed an Officer under and for the purposes of the Animals and Birds Acts.

Mr. H. R. Horton, of Eumundi, has been appointed an Honorary Inspector under the Diseases in Plants Acts.

The appointment of Mr. C. R. Toop as part-time Veterinary Officer, Northern District, has been cancelled, and Mr. J. G. Brandsen has been appointed in his stead, with headquarters at Atherton.

The Egg Pool has been extended until the 31st August, 1925, and the present Members of the Board to deal with such Pool will hold office until that date.

The resignation of Mr. I. G. Hamilton as Temporary Plant Breeder, Cotton Section, Department of Agriculture and Stock, has been accepted as from the 10th August, 1925.

Mr. W. H. Austin, State Trade Commissioner, has been appointed Representative of Queensland on the Australian Meat Council.

Messrs. C. G. Young and J. Beck, of Deeford and Stanwell respectively, have been appointed members of the Cotton Advisory Board, *vice* Messrs. C. W. McLean and A. H. Carrington.

Stabilisation of Agricultural Prices.

The British Ministry of Agriculture has issued as the second of its series of reports on economic questions relating to agriculture a report by a committee appointed by the late Minister of Agriculture to consider the problem of the stabilisation of agricultural prices. The subject is one of the highest importance to British agriculturists, and the report which deals with it opens up new fields for thought and inquiry into the complex economic conditions which surround British agriculture. It is to be hoped that persons who are interested in the modern organisation of agriculture will not fail to give these problems their due attention.

First of all, the report analyses the many causes which bring about fluctuations in the prices of agricultural commodities, and the harm which those fluctuations cause, showing in a striking manner that not only in recent years but in earlier periods of agricultural history a sharp or prolonged rise in the purchasing power of money has had serious and sometimes disastrous consequences to agriculture. Generally, it favours a policy of monetary stabilisation on the lines of the financial resolutions of the Genoa Conference held in 1922, and recommends that steps should be taken to put this policy into practice.

The remainder of the report deals with fluctuations in prices due to conditions of supply and demand. It shows how agriculture suffers in a peculiar degree from the fact that demand is relatively steady, while supply, depending as it does on conditions beyond the control of the grower, is liable to vary very widely. A striking example of this and its effects on prices is shown in the case of hops. Potatoes, eggs, fruit, and vegetables, and indeed most other agricultural products, are liable to suffer similar fluctuations in a greater or less degree. The possible remedies are next considered, and attention called to the almost universal movement towards the centralisation of marketing in agriculture, and particularly to the great advances made in this direction in the United States and the Dominions.

The report puts forward the suggestion that what the Americans call "orderly marketing" might, if applied to commodities mainly produced in Britain, be successful in creating a more even flow of agricultural produce to market. As regards marketing foodstuffs which are mainly imported from abroad, the possibilities of establishing a more stable system in regard to them are briefly reviewed and discussed.

The Fruit Industry.

A deputation representative of the Fruit Standing Committee of the Council of Agriculture in the personnel of Messrs. T. M. Ruskin (Chairman), J. A. Grassick, T. W. McEwan, C. Batman, and C. W. Fielding waited on the Minister for Agriculture (Hon. W. Forgan Smith) recently, and urged that the Fruit Branch of the Department of Agriculture be reorganised, and that experts be appointed for the citrus, deciduous, pineapple, and banana sections of the fruit industry. The deputation pointed out that the value of those sections of the fruit industry warranted the appointment of experts who would be able to devote the whole of their time in dealing with the particular problems of the respective sections. This would materially benefit the fruitgrower, and enable him to have the advice of experts in the production of his commodity.

The Minister, in reply to the deputation, expressed himself as being sympathetic to any proposal that had for its object the advancement of agricultural production in the State. He pointed out, however, that in any scheme of reorganisation, it was essential to have co-ordination between the proposed sectional divisions, and he thought that if that co-ordination could be secured, the scheme might be advantageously adopted. He promised to go very fully into the whole matter, and would see whether anything could be done to achieve the objective underlying the deputation's request.

Durango Cotton—Coming Season's Planting.

Questioned on the suggestion that only Durango cotton seed should be issued for planting during the coming season, the Minister for Agriculture (Hon. W. Forgan Smith) has announced that it is the policy of the Government to encourage the planting of better quality cotton, and for this reason he is anxious to see as large an area of Durango planted in the coming season as possible. This variety has given most promising results over large sections of the State, and in those few instances where it is reported to have yielded poorly the cause was apparently due to unfavourable weather conditions rather than to any inherent fault in the seed. Durango is the only pure variety of which the Department has any large quantity of seed yet available, and growers are advised to plant this variety until the departmental officers have had time to breed and propagate sufficient seed of new types and varieties now being tested. Some farmers who have not tried this variety have been somewhat disturbed by one or two current Press reports. They do not realise that Durango is also an Upland cotton and has the merit of being pure, and it produces a longer stapled and much more valuable fibre than the ordinary mixed seed. In view of the fact that prices for the ensuing season are to be based on length of staple as well as on grade, growers will, therefore, find it advisable to consider carefully whether it will not pay them to grow the pure variety instead of the old mixed seed, which bears every sign of rapid deterioration, and which has in fact degenerated greatly, particularly in the last two years.

There will be no compulsion, and growers may choose between Durango and the ordinary mixed seed, and may send in their applications for seed accompanied with a remittance of ½d. per lb. to the Assistant General Manager of the British-Australian Cotton Association, Whinstanes.

In order to safeguard the purity of the Durango seed, the Department is arranging for pure seed areas grown by communities of farmers who have expressed their desire to co-operate.

The Cotton Industry.

The Minister for Agriculture (Hon. W. Forgan Smith) has made available the following particulars concerning the cotton industry. Some time ago the Minister was requested by growers to sanction the decontrol of the industry with a view to arrangements being made with the Commonwealth Government to provide a bounty upon all cotton grown. He agreed to the proposal, but the Commonwealth Government has not made an announcement of its decision in the matter of the payment of a bounty.

As the season is approaching when the preparation of the soil for the forthcoming crop has to be taken in hand by the farmers, it is only reasonable that prospective cotton-growers should be advised as to the position. Accordingly the Minister stated that he desired it to be known that in the event of the Commonwealth Government not being prepared to accept the proposal to provide a bonus for cotton, the State Government was prepared to guarantee a price for the cotton grown in the forthcoming season. The guarantee would be based on the staple length as well as on the grade of the cotton. Full details of the guarantee will be made public as soon as opportunity allows of a consultation with the Commonwealth Government in the matter.

Orange-Sucking Bug—Advice to Citrus Growers.

Citrus growers in all districts where damage has been caused during recent years by orange-sucking bugs are strongly advised not to neglect the winter treatment of these insects, as at the present time they are in a dormant condition and can be easily destroyed, whereas if they become active in spring they are very much more troublesome and difficult to deal with.

There are two kinds of bugs, first the well-known Bronzy Orange Bug, which passes the winter in the form of small, very thin, flat, greenish bugs, which are found on the under side of the leaves and are easily overlooked unless the trees are carefully examined. The remedy is to spray trees on which the bugs are harbouring with a contact spray with an oil emulsion, resin wash, or similar insecticide. This will destroy all the young insects that it touches, and if systematically carried out will effectively rid the tree of the pests.

Probably some of the insects will fall on the ground, and these may be prevented from climbing back again on to the trees by placing a sticky bandage around the trunk so that the insect cannot cross it.

The other sucking bug is known as the Spiny Orange Bug. These insects pass the winter in the adult form and may be seen clustered in masses, varying from a few individuals to hundreds, attached to the smaller twigs usually in the top of the trees. If the trees are carefully examined these insects may be easily detected and caught and destroyed in large numbers. If left they start breeding as soon as warmer weather comes, and the trees are soon covered with a fresh crop of bugs.

If these simple precautions are carried out the damage caused by these pests will be materially decreased.

Warning to Cotton Growers—Fire Risks in Seed Cotton Consignments.

The Department of Agriculture and Stock wish to point out, as a warning to growers of cotton when preparing their seed cotton for despatch to the ginneries, the great danger of fire likely to be caused by leaving foreign substances amongst the seed cotton, such as matches, nails, clothing, stones, &c. The fire that occurred at the Gladstone ginnery on the 17th May last is an instance of what may happen through this extraordinary sort of carelessness. At this fire seven bales of lint cotton were damaged and the whole ginnery was in jeopardy. The following extract from the Police Magistrate's report on his inquiry into the origin of the fire is therefore worthy of careful attention:—

"It is clear that the fire commenced within one of the bales of cotton lint; an inspection of the bale after the fire revealed the fact that the fire had commenced from about the centre of the bale and had burnt its way from the centre to the outside of the bale, and coming into contact then with the air burst into flame, causing the damage previously mentioned.

"No person can be held responsible for the fire, which was not caused by the wilfulness or negligence of any person employed in or about the ginnery or otherwise. In my opinion it was caused by some foreign substance coming into contact with the gin saw, thereby causing a spark which had been pressed into a bale of cotton lint, and has smouldered for a considerable time within that bale, and burned out to the outside of the bale, setting fire to the hessian covering of that bale, the flames then reaching the other bales and setting fire to the building.

"This inquiry has emphasised the necessity of strict precautions being taken to prevent fires in cotton lint, which is highly inflammable, and also of a strict compliance with section 30 of "*The Cotton Industry Act of* 1923." From the evidence of the manager of the ginnery it is a common experience to find matches amongst seed cotton received at the ginnery. Matches may easily escape notice in the cleaner box and be brought into contact with the gin saw, through the feed pipe, and cause a very serious fire. Apart from matches it is evident that other foreign material, such as nails and pieces of iron, clothing, rocks, &c., are sometimes put into bales of seed cotton, and it may not generally be known that these articles when brought into contact with the gin saw are sufficient to cause a spark, which would become pressed into a bale of cotton lint and be the means of starting a serious fire and inconvenience to cotton-growers themselves. Special precautions should be taken to ensure the fact that no foreign substances are placed in bales of seed cotton when being forwarded to a ginnery."

DAMAGE DONE TO COTTON SEED BY PLANT BUGS.

E. BALLARD, B.A.F.E.S., Commonwealth Cotton Entomologist.

The plant bugs dealt with in this article are (1) the Harlequin bug, and (2) and (3) the large and small cotton stainers.

All three of these feed on the seeds in open bolls; the myriads of small cotton stainers and the bright red nymphs of the large stainers must be familiar to every cotton farmer.

The actual amount of stain produced by these insects in open bolls is so small as to be negligible. A previous article dealt with the damage done to green bolls where stain due to fungus diseases follows on the boll being pierced, but in the open boll any staining of the lint from these insects is very small indeed. They may very occasionally get squashed in the process of ginning and then stain the lint, but this in actual fact seldom happens, as by the time the cotton is ginned either all the "stainers" as a rule have left it or are dead and dried up, and, moreover, those which are still alive in the cotton pass through the gin unharmed. A few may be squashed during picking.

The accompanying photographs are taken from a sample of Durango from 1923-24 crop. At the top is a normal seed, and the rows below show quite well the appearance of seeds damaged by sucking insects.

If a normal seed is cut open the two halves appear quite solid and filled with the embryo which will be the future cotton plant. The seed leaves are seen to be spotted (Plate 53, No. 2), and the part which will form the first root (radicle) shows white and is easily distinguished from the rest of the embryo (Plate 53, No. 1).

When a seed has been pierced by either of the three bugs mentioned at the beginning of this article, its appearance differs in one or all of the followings ways:—

The radicle is shrunken and either stained a yellow-brown all over or has a yellow-brown ring round it. Yellow-brown areas may sometimes be seen in other parts of the embryo, more often at the butt of the seed, frequently at the side or in two or three places on the same seed. Sometimes all the seed is discoloured, and again, it may have shrunk to half its normal size.

Rarely the track of the stylets which have pierced it can be made out. This staining and discoloration is due, firstly, to the fact that the seed has been punctured and, secondly, to the action of a fungus and three or four bacteria. The fungus alone is capable of causing damage—the bacteria can only do damage when associated with the fungus. This fungus cannot enter the seed unaided, but only through a wound.

An examination of the photographs will give a better idea than any description of what happens to a seed when infected by this fungus through insect agency.

In Plate 53, No. 1, a normal seed is shown at the top; (1) the radicle (2) the folded cotyledons. The seed at the left-hand top row shows infection of the butt end of the seed (5). The seed marked (3) shows a damaged radicle, as does No. 4, while (6) and (7) are very advanced cases.

In the first photograph (Plate 52) the normal seed—the one at the top—has not come out so well, but the infected ones show cases of slight infection quite plainly. Note the shrinking which has taken place in the seed on the bottom right-hand corner (8). The butt end of the seed is more likely to get infected than the rest of it, as this is the part which is uppermost and upon which an insect would first alight. Seeds infected while in the unopened boll more usually show signs of disease at this spot than at the other end.

---

(1) *Tectacoris lineola* F.

(2) *Dysdercus sidæ*, Montr.

(3) *Oxycarænus luctuossis*, Montr.

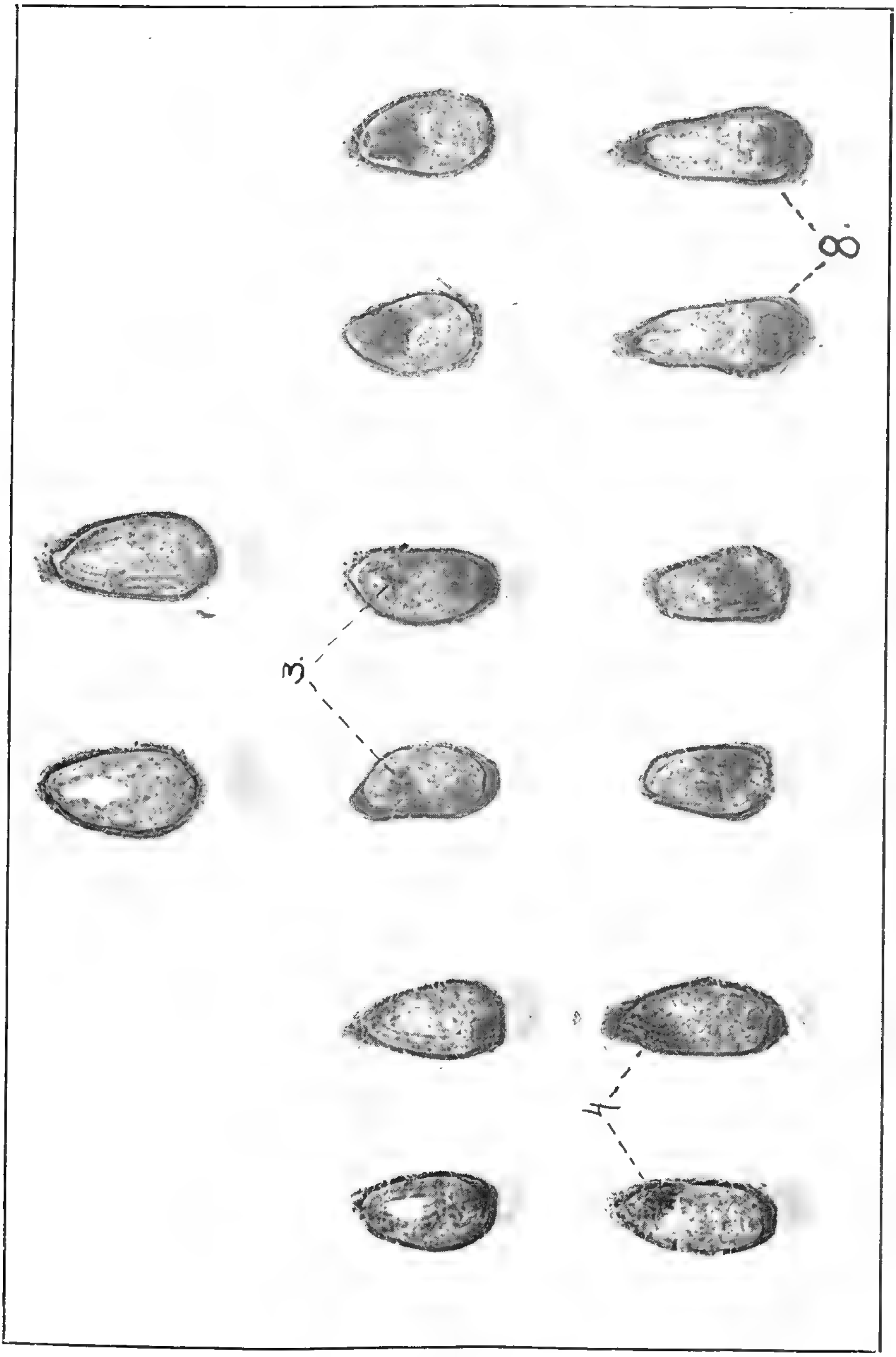


PLATE 52.—DURANGO COTTON SEED AFFECTED WITH FUNGUS DISEASE.
Top—Normal seed. Remainder—Early stages of infection.

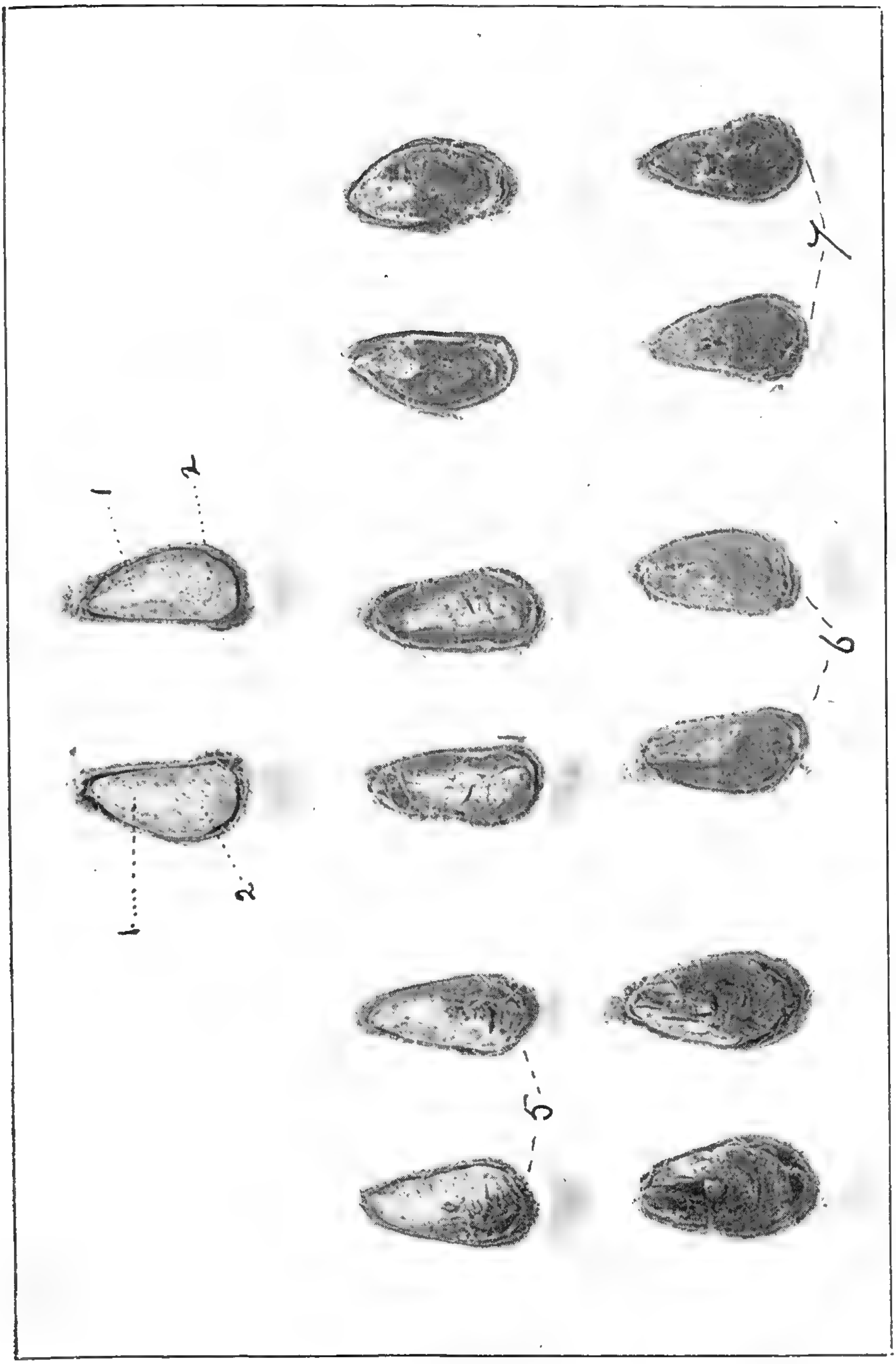


Plate 53.—Durango Cotton Seed affected with Bacterial (?) Disease.
Top—Normal seed. Remainder—Later stages of infection.

When such infected seed is sown, germination will probably take place if only the seed leaves have been infected and the fungus has not spread very far. If the root has been touched, then germination may begin but it will not be completed. Seed which has failed to germinate from this cause if cut open will show a brown slimy mass where the embryo had been. This is due to the combined action of the fungus and the bacteria.

Seed from 1923-24 crop showed 30 per cent. of the seed damaged by sucking insects. It may seem incredible that the young cotton stainers can pierce cotton seed with their delicate stylets or piercing organs of the proboscis, yet the fact remains that they can do so.

The obvious way in which to reduce the percentage of damage is to reduce the number of bugs—but up to the present no very satisfactory method of doing this, adapted to Queensland conditions, has been evolved. Experiments with traps have been conducted this season and gave rather promising results, but much more work must be done in this direction before any success can be claimed.

The Harlequin or Chinese bug can be kept under control by hand picking, but this does not apply to either the large or small cotton strainer—which it would be impossible to collect in this way.

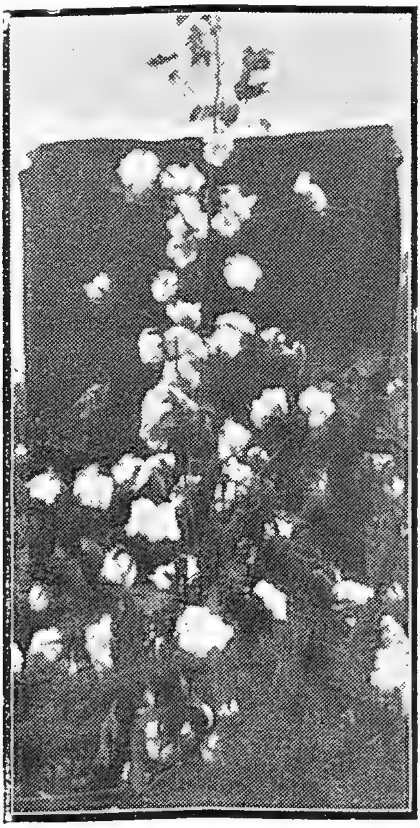


Photo.: N. A. R. Pollock.]

PLATE 54.

COTTON IN NORTH QUEENSLAND—A FAIR AVERAGE SAMPLE OF DURANGO.

Answers to Correspondents.

Mouth Affection in Pig.

W.C. (Kerraba, New South Wales)—

Your pig is apparently suffering from an overgrown tooth or from some abnormal condition of the mouth or throat, as there is no specific disease that would cause the symptoms to which you refer, nor would it appear that this trouble should render the animal unfit for human consumption, provided the pig is otherwise healthy and in suitable condition. It would appear also that as the animal has been such a growthy good doer that there was no serious disease checking his progress, so Mr. Shelton's advice is to use him in whatever way you think best. Nevertheless, after killing the pig, we would be interested to know if you found any abnormal condition, or if any of the internal organs appeared to be affected with disease. You could address your reply to Mr. Shelton direct.

Pig Feeds.

R.A.B. (Tamaree).—The Instructor in Pig Raising, Mr. Shelton, advises:—

The arrowroot plant is similar in type and growth to the ordinary garden variety of canna—in fact, arrowroot (*Canna edulus*) is a member of the same plant family. There is, as far as we are aware, no other dahlia-like plant of commercial value for pig-feeding purposes, and the bulbs of the ordinary garden dahlia should not be used as food for pigs, as they have no special food value and are largely fibrous. Cassava is grown extensively in Java and other countries, but not exclusively for stock food. The farmers in the Baffle Creek district, on the North Coast Line, grow Cassava a good deal, and it is used there as a pig food. They claim that its special local value—viz., that it can be used as a "stand over" crop during any portion of the year, and need not necessarily be dug at any particular time—gives it an added value over sweet potatoes, which in some districts do not carry well in the ground after they ripen. The latter crop is the one we specially recommend for all classes of pigs, but Cassava is well worth trial. Peanuts may, of course, be used as a food for pigs, but care is necessary in feeding "nuts" as they contain a large percentage of oil, and if used too freely will produce a soft oily pork of little or no value for curing or shop purposes. They are, however, a valuable stand-by, and are also worth trial. Seed may be obtained through any of the produce merchants in Gympie. Turnips, particularly swedes, are also of value for pig feeding, but they do not compare favourably with sweet potatoes, and are not as reliable.

Frost Prevention.

Mr. H. A. Tardent, of Wynnum, courteously supplies the following information to an inquirer:—

1. *Tar Drums.*—The best plan is to have a few on light hand sledges which can be moved from place to place, according to whence the morning breeze is blowing. Any ordinary tar will do. Sawdust may be mixed with it and a pine stick stuck in the midst of the drum. The price of tar may be ascertained from firms stocking it.

2. *Chemicals used by military and naval authorities for producing artificial smoke screens.*—It is presumed that information may be obtained direct from the military or naval authorities, as well as the conditions under which it may be supplied for frost prevention.

Great possibilities are anticipated in that direction, if the price of chemicals is not too high.

Smoke Screens.—Any attentive observer will notice that on a frosty morning the smoke has a tendency to descend from hillsides to form a kind of canopy over the low-lying places. It is, therefore, a good plan to burn the smoke-producing materials near the top of the hillside and to try to have as much as possible the smoke screen between the rays of the rising sun and the field to be protected. It is at about sunrise that the vegetable cells are burst and the damage is done, therefore the smoke screen must be ready before daybreak. Experiment for a few cold mornings with some cheap fuel is advised. Dry cane trash recovered with green weeds make excellent—and cheap—smoke-producing material.

Pig Breeding.

C.H. (Murgon)—

As far as our observations and experience go we feel sure that the Duroc Jersey crossed with the Berkshire would give results equally as good as the Tamworth-Berkshire cross. Quite recently the Instructor in Pig Raising, Mr. Shelton, inspected some bacon pigs sired by a Duroc Jersey boar and from a Berkshire sow. These, he says, were very suitable quality pigs of a desirable type, and we propose to illustrate these crosses and to give the weights attained by these pigs in an early issue of this Journal, a publication you should subscribe to, if not already a subscriber. The cost is but 1s. per annum to cover postage, and the Journal is regarded by all readers as a very useful publication, carrying regular articles on pigs as well as much other information of value to farmers.

Mr. Thos. Bellotti, of Ashfield Farm, Merlwood, *viâ* Murgon, has some Duroc Jerseys, as also has Mr. Leo. Delroy, of Merlwood, and Mr. C. M. Shelton, of the same centre. These farmers all speak well of the breed, and our opinion is that they are worth careful study, but further experiments are being arranged, and when the details and photographs of the animals concerned are available, they will also be given publicity in the Journal.

For the time being Mr. Shelton recommends your starting, for preference, with pure-bred or first-cross Tamworth sows and a pure-bred Berkshire boar. We could put you in touch with breeders having stock for sale, and shall be glad to assist you.

The Lrisbane Show Stud Pigs Sales will offer opportunity to purchase a number of pure-bred Tamworth sows, while doubtless Mr. George Keating of your own town would be able to offer you suitable cross-bred sows at about bacon values.

Pig Feeding.

G.W.M. (Casino, N.S.W.)—

From the table of rations, &c., given on the closing pages of the pamphlet on "Pig Raising in Queensland," which has been posted to you, you will note various rations in which a variety of food is used; the crop guide is also useful in that it refers to a great variety of crops used as foods for pigs. However, so long as you can grow lucerne, cowpeas, rape, and barley, and crops of a like nature, in addition to having good succulent herbage on which your animals may graze, there should be little or no need to spend very much on the purchase of protein concentrates, such as meat or linseed meal.

Milk is not a necessity on the pig farm, though it is undoubtedly the most valuable and economical food you can use, but for your purpose in feeding breeding sows, and indirectly and mainly through them feeding the young pigs you propose to breed for sale, your proposition is one in which the food given to the brood sow is the principal item to consider.

If the sow is properly fed the young pigs will need but little else than the sow's milk up to the age of six weeks or so, after which barley meal and vegetable matter, plus perhaps 5 per cent., or even up to 10 per cent., of meat meal would be the most suitable foods, and in this case cowpea meal, plus lucerne, could replace the meat meal if that concentrate were not available.

For autumn and winter brood sow feeding there is nothing better than root crops such as sweet potatoes, artichokes, mangel-wurzels, &c., &c. These are bulky, succulent foods much appreciated by sows, and if carefully handled they can be relied upon during the greater part of the winter and spring months. The best winter green food is Dwarf Essex rape and Skinless barley, sown in combination in the early autumn. If the worst comes to the worst you could fall back on chaffed lucerne hay, lucerne meal, or lucerne dust for protein during the driest of winters. These if soaked and fed with the other foods would be of much value. As to which is better, meat meal or linseed meal, our advice is to experiment for yourself with a couple of pens of pigs. Both meals are very useful, but in one sense they are both rather expensive, especially when they can be replaced with cheaper farm-grown protein foods.

Sows certainly benefit by having a large grazing area and good, clean, warm shelter sheds.

The pamphlet dealing with mineral mixtures for pigs gives details as to quantities to use in making up a suitable mixture.

The description of your styes is very interesting. We would be glad to have a good clean, sharp photograph of them.

Paralysis in Hindquarters of Pig.

B.T. (Copeland, New South Wales)—

Your sow appears to be affected with paralysis in the hindquarters. The swollen and tender joints are due in part to the other conditions, and they have no doubt been exaggerated by the variable weather experienced in the South recently. They are indicative of rheumatism and of a weakened constitution. Replace her with a more useful animal, a sow of good quality of the Berkshire or some other breed suited to the special purpose you have in view in the breeding of pigs. It is useless retaining stock for breeding purposes unless they prove entirely satisfactory and grow and develop to the best advantage.

Concrete Wallow for Pigs.

G.E. (Mount Larcom)—

Mr. Shelton, Instructor in Pig Raising, advises that a concrete wallow for pigs need not necessarily be an expensive convenience, nor need it be very large, that is unless a large number of pigs are being handled. If it is built to the following measurements it should suit admirably for about a dozen or more sows:—18 feet long by 6 feet wide and 20 inches deep, allow for 5 feet batten or drop towards the centre at each end and for 8 feet level bottom (20 inches deep) in the wallow. It would be preferable, of course, to use concrete as material, although the writer recently inspected a very satisfactory wallow in the Cinnibar district, which was constructed principally of rejected railway sleepers fitted together as closely as possible, the crevices being filled with a mixture of tar and sand. In this case the overflow from the windmill and tanks was allowed to flow into the wallow, thus ensuring a continuous supply of clean water. Much smaller wallows would, of course, be satisfactory where only two or three sows are being kept; one, say, 6 feet long 3 feet wide and 12 inches deep would at least provide a cool bath for the animals during hot weather.

Ailing Sow.

C.A.McR. (Gladstone)—

Where a pig develops sickness, particularly lung trouble to the extent to which you refer in your letter, it is almost impossible to suggest a reliable form of treatment which would prove beneficial, for once disease passes a certain stage in animals, it is frequently more risky to attempt treatment than to allow the animal to take its chance. Mr. Shelton, Instructor in Pig Raising, does not, in any case, recommend dosing the animal, unless it be by medium of food or water, for drenching an animal suffering from an advanced form of pneumonia is likely to prove disastrous. He cannot, therefore, recommend any other than careful handling, the provision of suitable accommodation, good clean dry bedding, and soft succulent nutritious food, such as a gruel composed of milk and some form of meal (pollard, maize meal, barley meal, wheat meal, &c.). The animals should have good clean drinking water; it is an advantage to add a teaspoonful or two of Sweet Spirits of Nitre to the water for each pig. It is an advantage, too, to allow the pigs a good area of succulent herbage over which to graze, and, if they are inclined to mope about, compel them to take liberal exercise, though not forced and continuous exercise, for this might prove fatal also.

You did not state the breeder's name from whom you purchased your pigs, but it is worth noting that pigs that are crated and despatched per train or steamer during the cooler months of the year frequently develop coughs and colds as a result of their crates being placed in cold draughty situations, the animals are also frequently unprotected during heavy showers of rain.

It is apparent that your pigs are not suffering from neglect on the farm, and your treatment of them to date appears to be satisfactory. Give them plenty of green food and abundant exercise, for this will prove an advantage in more ways than one.

In the event of the sow dying, it is quite possible the vendor would replace her if you informed him of the circumstances surrounding her death.

It is, of course, possible to insure stud animals both on the farm and in transit, and this is a matter well worth consideration, though, of course, the insurance companies will only issue a cover on animals which appear perfectly healthy.

We shall be glad to supply any further information.

Citrus Queries.

"ORCHARDIST" (Woombye)—

Your communication and specimens, addressed to the Fruit Expert, were referred to Mr. Henry Tryon, Government Entomologist and Vegetable Pathologist, who replies:—

As the correspondent must have perceived, the peel of every species of citrus—including lemon and mandarin, as well as "round oranges" generally—has oil-containing cells occurring densely everywhere just beneath the surface.

The oil of these cells readily issues from them on any—even slight—injury that the fruit may experience, whether of the nature of a bruise, skin-abrasion, puncture, or physical (*e.g.*, sunscald), chemical (*e.g.*, caustic spray-fluid) irritant. Moreover, when thus it has become exposed to the air it undergoes chemical change and forms a resin that is very difficult to dissolve; whereas, as an oil, it readily blends—with water even.

On the fruit this oil may spread-out so as to form patches or even occupy the entire surface; or little globules of it—one or more from each oil-cell—may run together to produce similar features.

In these cases the change above remarked—from oil to resin—soon takes place, and so we get a pale greyish-brown surface-film of varying extent, whose attachment to the surface of the peel is so intimate as not to admit of its even being readily scratched away.

Further, should this resinous film have been formed before the fruit is of its full size, it becomes finely cracked and fissured, as this presses it from beneath in the course of ordinary growth. Moreover, it may develop a dark colour, wholly or in part, due to little fungi of a mould-character growing upon it.

The fruit forwarded exhibits this resinous incrustation as occurring under three different circumstances.

(1) The round orange—on which this substance forms three large stains as it were. One can conjecture only how these have originated, but their shape would appear to indicate the former presence of some chemical irritant, such as may have accumulated where these marks occur—lime-sulphur of improper strength-solution, for example—or they may be due to sunscald where similarly water has become condensed. The mere swaying of the fruit against some weak obstacle may again produce skin blemishes, somewhat of the kind shown, but in its case greater irregularity of outline is produced.

(2) In this case indefinite cloud-like patches of greyness of varying density, occur on two opposite faces of the fruit. Here we find the cloud-like patches composed of numerous little rings with fine waved lines radiating from them in a very irregular manner so as to form an intricate picture. Each of these has evidently been formed by the individual oil-cell, under pressure of some kind, giving up its fluid-content, the oil first forming a ring around the lowly raised cell and then flowing outwards from it in a radiating manner. This may have been due to the fruit's exposure to sudden changes of temperature, and to its surface being unable to quickly respond to this influence whilst laden with juice, and so the oil becoming, as it were, squeezed outwards as an exudation from each oil gland.

(3) A round orange conspicuously marked with large, dark cloud-like markings, merging into one another outwardly, and showing in marked contrast to the remaining yellow surface-colour. This peculiar manifestation of oil-resin occurrence is what is known by citriculturists as "Maori," by reason of its characteristic colour. It is occasioned when the fruit is still green and is as yet not full grown. Then it appears as an indistinct greyish hue, that takes the place of the ordinary brightness and pure green of the healthy rind. Moreover, trees exhibiting these early symptoms in their oranges also exhibit a want of brightness in the foliage that one can soon learn to recognise. This is caused by innumerable little forms of life of an elongated form and of a pale sulphur hue of colour. The insect is named *Phytopus oleivorus,* two words signifying "leaf cutter" and "oil feeder." These on their hosts, whilst biting the surface of fruit or leaf, cause a minute quantity of oil to exude on the surface, and hence the delicate fine encrustation that darkens with age. At first the *Phytopus* mites may readily be discerned by aid of a good hand-lens, on viewing with it the surface of the green fruit of a tree that has earlier borne "Maori" fruit; but later in the season, when this fruit is maturing or is even ripe, only small minute white elongated fragments (cast skins) persist to indicate the former presence of the agent—the cause of the "Maori." This trouble that seriously impairs the appearance and sale of the orange crop, may be prevented by the timely use of any substance that contains sulphur—dry or fluid—but preferably the latter in the form of a mist-like spray such as sulphide of potash or sulphide of soda dissolved in a soap-solution.

Farm and Garden Notes for September.

With the advent of spring, cultivating implements play an important part in farming operations.

The increased warmth of soil and atmosphere is conducive to the growth of weeds of all kinds, particularly on those soils that have only received an indifferent preparation.

Potatoes planted during last month will have made their appearance above the soil, and where doubt exists as to their freedom from blight, they should be sprayed with either Burgundy or Bordeaux mixture as soon as the young leaves are clear of the soil surface.

Land which has received careful initial cultivation and has a sufficiency of sub-surface moisture to permit of a satisfactory germination of seeds may be sown with maize, millets, panicum, sorghums, melons, pumpkins, cowpeas, broom millets, and crops of a like nature, provided, of course, that the areas sown are not usually subjected to late frosts.

Rhodes grass may be sown now over well-prepared surfaces of recently cleared forest lands or where early scrub burns have been obtained, and the seed is sown subsequent to showers. More rapid growths, however, are usually obtainable on areas dealt with, say, a month later.

In connection with the sowing of Rhodes grass, farmers are reminded that they have the Pure Seeds Act for their protection, and in Rhodes grass, perhaps more than any other grass, it is necessary that seed of good germination only should be sown. A sample forwarded to the Department of Agriculture will elicit the information free of cost as to whether it is worth sowing or not.

Where the conditions of rainfall are suited to its growth, paspalum may be sown this month.

The spring maize crop, always a risky one, requires to be sown on land which has received good initial cultivation and has reserves of soil moisture. Check-row seeding in this crop is to be recommended, permitting as it does right-angled and diagonal cultivation by horse implements, minimising the amount of weed growth, and at the same time obtaining a soil mulch that will, with the aid of light showers, assist to tide the plant over its critical period of "tasselling."

Although cotton may be sown this month, it usually stands a better chance if deferred until October. The harvesting of cotton during the normal rainy season is, if possible, to be avoided.

The sowing of intermediate crops prior to the preparation of land for lucerne sowing should be carried out in order that early and thorough cultivation can take place pior to the autumn sowing.

The following subsidiary crops may be sown during the month:—Tobacco and peanuts, plant sweet potatoes, arrowroot, sugar-cane, and cow cane (preferably the 90-stalked variety), and in those districts suited to their production yams and ginger. Plant out coffee.

Kitchen Garden.—Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Manure for the garden during summer should be in the liquid form for preference. Failing a sufficient supply of these, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case, stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be of great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly dug beds. What the action of salt is, is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile, and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada bean, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool

districts, peas and even some beetroot may be sown. Set out egg plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinnach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory, provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

Orchard Notes for September.

THE COASTAL DISTRICTS.

September is a busy month for the fruitgrowers in the coastal districts of this State, as the returns to be obtained from the orchards, vineyards, and plantations depend very largely on the trees, vines, and other fruits getting a good start now.

In the case of citrus orchards—especially in the Southern half of the State—it is certainly the most important month in the year, as the crop of fruit to be harvested during the following autumn and winter depends not only on the trees blosoming well but, what is of much more importance, that the blossoms mature properly and set a good crop of fruit.

This can only be brought about by keeping the trees healthy and in vigorous growth, as, if the trees are not in this condition, they do not possess the necessary strength to set their fruit, even though they may blosom profusely. The maintenance of the trees in a state of vigorous growth demands—first, that there is an adequate supply of moisture in the soil for the requirements of the tree; and, secondly, that there is an adequate supply of the essential plant-foods available in the soil.

With respect to the supply of moisture in the soil, this can only be secured by deep and systematic cultivation, excepting in seasons of good rainfall or where there is a supply of water for irrigation. As a rule, September is a more or less dry month, and when it is dry there is little chance of securing a good crop of fruit from a neglected orchard.

If the advice that was given in the Notes for August regarding the conservation of moisture in the soil has been carried out, all that is necessary is to keep the soil stirred frequently, so as to prevent the loss of moisture by surface evaporation. If the advice has been ignored, then no time should be lost, but the soil should be brought into a state of good tilth as quickly as possible.

Where there is a supply of water available for irrigation, the trees should receive a thorough soaking if they require it. Don't wait till the trees show signs of distress, but see that they are supplied with an adequate supply of moisture during the flowering and setting periods.

It is probable that one of the chief causes why navel oranges are frequently shy bearers in the coastal districts is that the trees, though they produce a heavy crop of blossoms, are unable to set their fruit, owing to a lack of sufficient moisture in the soil at that time, as during seasons when there is a good rainfall and the trees are in vigorous growth or where they are grown by irrigation, as a rule they bear much better crops. The importance of maintaining a good supply of moisture in the soil is thus recognised in the case of this particular variety of citrus fruit.

When the trees show the want of sufficient plant-food—a condition that is easily known by the colour of the foliage and their weakly growth, the orchard should be manured with a quick-acting, complete manure; such as a mixture of superphosphate, sulphate of ammonia, and sulphate of potash, the plant-foods which are soluble in the water contained in the soil and are thus readily taken up by the feeding roots.

Although the above has been written mainly in respect to citrus orchards, it applies equally well to those in which other fruit trees are grown. Where the land has been prepared for bananas, planting should take place during the month. If the plantation is to be made on old land, then the soil should have been deeply ploughed and subsoiled and brought into a state of perfect tilth prior to planting. It should also receive a good dressing of a complete manure, so as to provide an ample supply of available plant-food. In the case of new land, which has, as a rule, been scrub that has been recently fallen and burnt off, the first operation is to dig the holes for the suckers at about 12 ft. apart each way. Good holes should be dug, and they should be deep enough to permit the top of the bulb or corm of the sucker to be 6 in. below the surface of the ground.

Take great care in the selection of the suckers, and see that they are free from beetle borers or other diseases.

As a precaution it is advisable to cut off all old roots and to dip the corms for two hours in a solution of corrosive sublimate, made by dissolving 1 oz. of this substance in 6 gallons of water.

In old banana plantations keep the ground well worked and free from weeds and remove all superfluous suckers.

Where necessary, manure—using a complete fertiliser rich in potash, nitrogen, and phosphoric acid, such as a mixture of meatworks manure and sulphate of potash, 4 of the former to 1 of the latter.

Pine apples can also be planted now. The ground should be thoroughly prepared —viz., brought into a state of perfect tilth to a depth of at least 1 ft., more if possible—not scratched, as frequently happens; and when the soil requires feeding, it should be manured with a complete manure, which should, however, contain no superphosphate.

Old plantations should be kept in a good state of tilth and be manured with a complete fertiliser in which the phosphoric acid is in the form of bones, basic phosphate, or finely ground phosphatic rock, but on no account as superphosphate.

The pruning of custard apples should be carried out during the month, leaving the work, however, as late in the season as possible, as it is not advisable to encourage an early growth, which often means a production of infertile flowers. If the weather conditions are favourable passion vines can also be pruned now, as if cut back hard they will make new growth that will bear an autumn crop of fruit instead of one ripening during the summer.

Grape vines will require careful attention from the time the buds start, and they should be regularly and systematically sprayed from then till the time the fruit is ready to colour with Bordeaux mixture, in order to prevent loss by downy mildew or anthracnose.

Where leaf-eating beetles, caterpillars, or other insects are present, the trees or plants on which they are feeding should be sprayed with arsenate of lead. All fruit-fly infested fruit must be gathered and destroyed and on no account be allowed to lie about on the ground, as, if the fly is allowed to breed unchecked at this time of the year, there is very little chance of keeping it in check later in the season.

GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Where not already completed, the winter spraying with lime-sulphur should be finished as early in the month as possible. Black aphis should be fought wherever it makes its appearance by spraying with a tobacco wash, such as black-leaf forty, as if these very destructive insects are kept well in hand the young growth of flowers, leaves, wood, and fruit will have a chance to develop. Woolly aphis should also be systematically fought wherever present, as once the trees are in leaf it is much more difficult to treat.

The working over of undesirable varieties of fruit trees can be continued. The pruning of grape vines should be done during the month, delaying the work as long as it is safe to do so, as the later the vines are pruned the less chance of their young growth being killed by late frosts. Keep the orchards well worked and free from weeds of all kinds, as the latter not only deplete the soil of moisture but also act as a harbour for many serious pests, such as the Rutherglen bug.

Grape vines should be swabbed with the sulphuric acid solution, mentioned in the Notes for August, when the buds begin to swell and just before they burst, as a protection against black spot and downy mildew.

New vineyards can be set out, and, in order to destroy any fungus spores that may be attached to the cuttings, it is a good plan to dip them in Bordeaux mixture before planting. The land for vines should be well and deeply worked, and the cutting should be planted with one eye only out of the ground and one eye at or near the surface of the ground.

In the warmer parts which are suitable for the growth of citrus fruits, the land must be kept well cultivated, and if the trees need irrigating they should be given a good soaking, to be followed by cultivation as soon as the land will carry a horse without packing.

In these parts fruit-fly should be systematically fought, as it will probably make its appearance in late citrus fruits and loquats; and if this crop of flies is destroyed, there will be every chance of the early crops of plums, peaches, and apricots escaping without much loss.

Photo.: Daily Mail.]

PLATE 55.—THE WISE PIGLET NEVER MISSES AN OPPORTUNITY.

A USEFUL FENCE FOR PIG PADDOCKS.

This type of fence, though somewhat expensive in the first instance, is undoubtedly of such solid construction that it will prove satisfactory for at least twenty years. Pig fencing requires to be of a permanent and efficient nature, otherwise a great deal of expense will be incurred in repairing and keeping the fence in order, for pigs are severe on fencing, and if it is not of solid construction they will soon root or force their way through, under, or over. Post, rail, and picket fencing of the type illustrated is recommended particularly for pig yards and small pig runs, as well as for pig paddock purposes generally. The photograph is sufficiently clear to provide all the details necessary as regards construction, though it might be noted that the pickets should be inserted into the ground to the depth of at least 3 inches below the ground level. The height of the fence will depend entirely on local conditions; it should be sufficiently high not only to keep the pigs in but to keep horses and cattle out. The fence needs to be higher if it forms part of the boundary fence of the farm than if it forms part of a subdivision fence inside the ring fence.—E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Plate 56. A Useful Type of Fence for Pig Paddock.

Photo.: N. A. R. Pollock.]

Plate 57.—A "Sugar Bag" near Cooktown.

In country where hollow trees are scarce, bees sometimes build their honey-comb on a sheltered part of a tree trunk.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. K. CHAPMAN.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

1925.	July.		August.		Moonrise. July.	Moonrise. Aug.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	6 43	5·7	6·34	5·22	p.m. 1·2	p.m. 1·57
2	6 43	5 7	6·34	5·22	1·42	2 56
3	6 43	5 8	6 33	5·23	2 28	3·59
4	6·43	5·8	6 32	5·23	3·19	5·5
5	6 43	5·9	6·31	5·24	4 15	6 14
6	6·43	5 9	6·31	5·25	5 18	7 22
7	6 43	5·9	6·30	5 25	6 25	8 26
8	6·43	5 10	6·29	5·26	7·32	9 27
9	6·43	5 10	6·29	5 26	8 38	10·26
10	6·44	5 10	6·28	5 27	9·42	11·23
11	6·44	5·11	6·27	5·27	10·42	nil
12	6 43	5·11	6·26	5·28	11·41	a.m. 12 19
13	6·42	5·12	6·25	5·28	nil	1·14
14	6 42	5 12	6·24	5·29	a.m. 12·35	2 6
15	6 42	5·13	6 23	5·29	1·32	2 59
16	6 41	5 14	6·22	5·30	2 26	3 48
17	6·41	5 14	6·21	5·30	3·20	4 3[illegible]
18	6 41	5 15	6·20	5·31	4·12	5·19
19	6 40	5·15	6·19	5·31	5 3	6·1
20	6·40	5 16	6·18	5 32	5 52	6 39
21	6·40	5 16	6·18	5·32	6 38	7·16
22	6 39	5 17	6·17	5·32	7·21	7·50
23	6·39	5 17	6·16	5·33	8·2	8·26
24	6 39	5·18	6·15	5 33	8·43	9 1
25	6 38	5 18	6·14	5·33	9·15	9 [illegible]7
26	6 38	5·19	6·13	5·34	9·48	10·16
27	6·37	5 19	6 12	5 34	10 23	10·59
28	6 37	5·20	6 11	5·35	11·0	11 47
29	6·36	5·20	6 10	5·35	11·37	p.m. 12 38
30	6 36	5·21	6·9	5·36	p.m. 12·19	1·40
31	6·35	5·21	6·8	5·36	1·5	2·43

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

6 July	○	Full Moon	2 54 p.m.
13 ,,	☽	Last Quarter	7 34 a.m.
21 ,,	●	New Moon	7 40 a.m.
29 ,,	☾	First Quarter	6 23 a.m.

Perigee, 6th July at 12 16 p.m.
Apogee, 20th ,, at 12 30 p.m.

On 3rd July at midday the earth will be in the part of its orbit which is at the greatest distance from the sun, 94,500,000 miles. On [illegible]th July at 10.25 p.m. Jupiter will be in conjunction with the moon, that is apparently so close to it as to appear less than four diameters of the moon south of it. Both will be high up in the sky nearly due north. On 16th July at 8 p.m. Jupiter will be directly opposite to the sun, rising soon after the sun sets. On 1[illegible]th July about half an hour or a little more after sunset, if the western sky is clear, the three planets, Mercury, Venus, and Mars, will be seen apparently very close to one another rather low down in the west, while not far above them the the bright star Regulus of Leo will add to the beauty of the scene. An annular eclipse of the sun will take place on 21st July, but visible only as a partial eclipse throughout the greater part of Queensland. Venus will be occulted by the moon on the 23rd about midday in Northern Queensland, but appearing to be a little above the moon though very near to it in the more southern parts of Queensland. An interesting daylight spectacle will be somewhat marred on this occasion by its nearness to the sun. Mercury will be in conjunction with the moon at 4.[illegible]6 p.m. on the 23rd and should be noticeable in the western sky at sunset. On the 28th Mercury will be at its greatest height above the horizon at sunset.

4 Aug.	○	Full Moon	8 59 p.m.
11 ,,	☽	Last Quarter	7 11 p.m.
19 ,,	●	New Moon	11 15 p.m.
27 ,,	☾	First Quarter	2 46 p.m.

Perigee, 4th August at 8 0 a.m.
Apogee, 17th ,, at 4 0 a.m.

A partial Eclipse of the Moon will take place on the 4th between the hours of 8.27 p.m. and 11.17 p.m., when the Moon will apparently change from full to a crescent shape at 9.53 p.m., and again become full.

THE PLANETS.

Jupiter will be in conjuction with the Moon on the 3rd. at 3.55 a.m. Venus will be in conjunction with the Moon on the 22nd at 3.46 p.m., when the planet will be about seven times the diameter of the Moon above it. Saturn will be in conjunction with the Moon at 5.46 p.m. on 25th, and will be well seen in the west soon after sunset.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

A Cross in this space is a reminder that your Subscription to the Journal expires with this number.

ANNUAL RATES OF SUBSCRIPTION.
Farmers, Graziers, Horticulturists, and Schools of Art FREE on prepayment of 1/- to cover postage. Members of Agricultural Societies, 5/-, including postage. General Public, 10/- including postage.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXIV. 1 SEPTEMBER, 1925. PART 3.

Event and Comment.

The Current Issue.

The great event of Queensland's year—the Royal National Exhibition at Brisbane—is fittingly described and illustrated. The Gutta Percha tree, the eating of which is reputed to have caused considerable mortality in a mob of travelling sheep, is briefly noted by Mr. Cyril White. A further report on Fruit Fly Investigations at Stanthorpe is contributed by Mr. Hubert Jarvis. Mr. Tryon has some notes on Tomato Blight and on the Bean Fly. Some interesting entomological notes for cane-growers are also supplied by Mr. Edmund Jarvis. The marketing of pigs in Queensland is discussed by Mr. Shelton in a further instalment. Among other special features is an account of the Pig Club movement which is embraced in the Home Projects Scheme initiated recently by the Education Department in connection with our rural schools. Other specially contributed matter, referred to in these notes in the last issue, has had, quite unavoidably, to be held over again. The October number will be a comprehensive issue, and among other interesting special features will be an impressive farewell message to the farmers of Queensland from His Excellency the Governor, the Right Hon. Sir Matthew Nathan.

The Royal National Association—Fifty Years of Progress.

The President of the National Association, Mr. Ernest Baynes, in the course of an address at the opening of the Brisbane Show, said that this year marked an epoch in the history of the Association. For fifty years annual shows had been held, each showing an improvement on its predecessor. Last year they established many records, but further records would be broken. Fifty years ago the situation of the present two show rings was marshy swamp land and rocky broken gullies, and it was only by an expenditure of over £15,000 that portion of it was reclaimed and made available for show purposes. Since the foundation of the Association fifty years ago nearly £250,000 had been expended in the purchase of freehold land and the erection of permanent improvements, including the splendid grand stands and other seating accommodation, capable of housing nearly 40,000 persons. Show buildings and other improvements tended to make the Brisbane Show Ground one of the best in the Commonwealth. Mr. Baynes also paid tribute to the early pioneers and the work they had done in building up the Show and making it a success. Some little time ago, he said, the Association had issued invitations to all who had been present at the first Show fifty years ago, and they were gratified to know how many had accepted the invitation.

Give Your Best!

"I do not propose, on this last occasion, to dilate upon any topic or offer you any long advice. I am going to give one word, however, and the one advice I wish to leave behind me is—get rid of two words in your vocabulary—get rid of the words 'good enough.' There is nothing that is good enough when you come into competition in world-wide markets." These striking phrases formed the keynote of the speech of His Excellency the Governor-General, Lord Forster, at the official luncheon on the opening day of the Brisbane Show. "Australians," he continued, "would have to look to the world market for the continued development of their great continent, and if they were going to succeed in the world's markets the words 'good enough' must be marked out of their vocabulary. Therefore he hoped the lesson given by that great Association would be taken to heart deeply by the man on the land. If he were going to market his stuff in the world's markets, he had to meet the world's competition. The only way to meet that was to send their best. They could produce it in Australia. They knew they could. What they wanted to do was to encourage the men who were engaged in production to realise it and accomplish it. When he laid down the great honour conferred on him by the King, the honour of representing him in the Commonwealth, he would do it with the greatest reluctance. He held that to so represent the King was the greatest honour that could befall a man. He wished Australia and Australians every blessing that God could give them."

A Forestry Conscience.

"This Jubilee Show reflects not only the courage and energy of the Association, but is also a tribute to the work of the pioneers and of all who have helped to bring about its success," said the State Premier (Hon. W. N. Gillies) on the same occasion. "The only tinge of sadness about it," he continued, was the absence of the State Governor (Sir Matthew Nathan). Last year the Governor-General had given good advice to the people of the country, and personally he (Mr. Gillies) had been grateful to him for his remarks about cotton and afforestation, and particularly for trying to create in the minds of the people a forestry conscience. It was difficult for politicians to concern themselves about forestry, for it had to do with posterity, and they were inclined to say, 'What has posterity done for us?' But there was a duty to the people in this matter, because the present generation was largely destroying what belonged to the coming generation."

The Best State of the Commonwealth Group.

"As for the Show," Mr. Gillies continued, "it was a reflex of the State, because it showed the energy displayed by the community in getting together such a display during the winter season. Visitors from the South must have been surprised at the really wonderful display that was put before them. He was satisfied that people from the Southern States would take away a full recognition that Queensland was the best State of the Commonwealth. Such a Show must bring home the words of President Garfield, 'That the head of civilisation was not militarism or commerce, but agriculture—the great mother of industry.' Primary production must be encouraged, and the wisdom of these words brought home to the people. It would be better, of course, if the capital of the State were in a more central situation, but with the completion of the great Coastal railway they had been able to attract the people from the North to Brisbane to see what the country could do. The Local Authorities' Conference and other conferences had also afforded an opportunity to bring home the truth that the country was necessary to the city and the city to the country. It also brought home the duty to provide markets and to establish secondary industries. As Minister for Agriculture during five years, his job had been to encourage primary production. He recognised that the country must have two legs on which to stand—primary and secondary industries. In this connection, he was pleased to notice that the Federal Treasurer (Dr. Earle Page) had declared that he was going to amend the Commonwealth Bank Act to make it possible for farmers to harvest and market their produce. Farmers had the best security to offer, but in many cases the industry was disorganised, and it was pleasant to note, therefore, that the Federal Treasurer was going to make it possible for the bank to provide the finance necessary for the pooling system, and for the marketing of primary products. Too much praise could not be given to the present president, the committee, and those who had organised the Show, but they must not forget what the pioneers had done. Going back fifty years they could recall the names of Sir Robert Mackenzie, John Fenwick, Governor Cairns, Sir Arthur Palmer, Sir Thomas McIlwraith, Sir Joshua Peter Bell, Messrs. Raff, Grimes, and others, who had taken an interest in the establishment and early history of the society, and had helped it in later years. He would like to compliment Messrs. Baynes, Affleck, and the secretary (Mr. J. Bain) on their efforts—the success of the present Exhibition reflected the support received from the officials, stewards, and exhibitors."

Bureau of Sugar Experiment Stations.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations has received the following report (30th July, 1925) from the Entomologist (Mr. Edmund Jarvis) at Meringa, near Cairns:—

Poison Baits for Cane Grubs.

Laboratory experiments were carried out towards the end of June with sodium arsenite, which was administered to grubs of *albohirtum* in the form of certain baits of presumably palatable nature.

These consisted of thin transverse sections of cane sticks, megass, and bran, that had been boiled for about five minutes in a strong solution of this poison, and then allowed to dry before application to the soil.

The baits were placed at the bottom of cages of moist earth, each containing a third-stage grub of the greyback cockchafer.

The best results were secured from the sections of cane stick, which caused a mortality of 25 per cent. the first day, 50 per cent. on the fourth day, and 100 per cent. a week after application. The poisoned megass and bran yielded about 85 per cent. mortality after seven days. These initial preliminary experiments will be followed up by further research in connection with this interesting phase of grub control.

Parasites of Cane "Skippers."

The larvæ of several species of Hesperidæ ("skipper" butterflies) have been recorded as destructive to the foliage of cane in several sugar-growing countries, such as Porto Rico, Mexico, Trinidad, British Guiana, &c.

Since the year 1915 five species have been discovered eating cane leaves in North Queensland; two of these occurring also on cane in Java. Hesperid caterpillars usually feed under cover, by drawing together the edges of a leaf-blade in such fashion as to form a short tube from 2 to 4 in. long, in which they are effectually screened from the view of birds and other predaceous foes.

Transformation to the pupal condition generally takes place within the seclusion of this tube, the tail-end of the pupa being affixed by anal hooks to a mass of threads spun for this purpose, while the body is further secured by a strong girdle of silk crossing the middle of same and firmly attached to the leaf-blade on either side. *Padraona marnas* Feld is, perhaps, our commonest cane "skipper," varying in size from 1 to 1¼ in. across the expanded wings. Its general coloration is dark-grey to black, with tawny orange-yellow markings arranged in the form of a broad band on the middle of hind wing, and irregular patches extending over the basal and central portions of the front wing.

The life-cycle was briefly described to canegrowers by the writer in 1916 (Bulletin No. 3 of this Experiment Station).

Its plentiful occurrence this season at Saw Mill Pocket, Kamma, and Meringa, enabled us to obtain interesting data regarding the native parasites of this species, which evidently serve to effectually control its increase. Those bred here between the dates—4th to 30th June—consisted of an ichneumon wasp (allied to Henicopsilus); a braconid (near *Opius*); three species of Chalcididæ (*Chalcis parflavipes* Gir., and two undetermined) and a proctotrypid wasp. The cane affected by this butterfly was reported by Mr. Bates to be growing on low-lying ground bordering swamp land, and closely surrounded by blady grass. The headlands were covered with burrs; and weeds were much in evidence also among the cane.

In all probability blady grass will prove to be a native food-plant of more than one species of our Hesperidæ; so that when growing on headlands those butterflies are liable to invade and oviposit on young cane leaves, and in some cases may gradually acquire a liking for the foliage of sugar-cane.

Benzine as a Grub Fumigant.

During 1923 laboratory experiments with benzine were made by the writer to test the effect of its vapour on grubs of the greyback confined in cages of moist soil. The fumes quickly caused diarrhœa accompanied in some instances by protrusion of a portion of the alimentary canal. The first experiment consisted of six cages; each containing a third-stage grub in about 80 cubic inches of moist soil. A dose of 5 cc. (about ⅙th oz.) was applied to the surface soil of each cage; the result obtained being a mortality of 100 per cent. after three days. In two similar experiments conducted during March, 1923, these results were confirmed, all grubs used being dead about three days after application of the fumigant.

The toxic action of benzine fumes was further studied by us last May, 1925. The soil in eight cages, holding about 27 cubic inches, was injected with 1½ and 3 cc. doses, which, although very small, caused a mortality of 100 per cent. by the end of six days.

The above amounts of benzine, however, were found too little to destroy grubs in big cages of soil (80 cubic inches). A final experiment was accordingly carried out in which doses likely to be used in field application were given to fully grown grubs of *albohirtum* in large cages of earth.

These grubs, which were placed on the bottoms of the cages, were treated with ½ oz. doses of benzine, poured on top of the soil about 4 inches above them; all cages being left open at the top.

Within twenty-four hours these grubs were very sickly; 100 per cent. ultimately dying within forty-eight hours after treatment.

This fumigant would probably act more quickly during warm weather, at a time when cane grubs are feeding vigorously and display greater activity; hence the results mentioned above obtained during the month of March (100 per cent. mortality in three days from a dose of ⅙th oz.). Those used for our recent experiments in July were about to transform into pupæ; a condition during which respiratory movement—consisting of alternate contraction and recovery of the shape of the body—becomes less frequent or pronounced; the grub at such times lying inert in a pupal chamber while its internal organs are undergoing profound changes in order to fit the species for an aerial existence during its imago or perfect state.

Crickets Attacking Sugar-Cane.

A curious insect was forwarded to me last month for identification from Home Hill, Ayr district, by Mr. E. H. Osborn, whose attention was drawn to its occurrence in canefields as a pest.

This proved to be one of the Gryllidæ or crickets, a family of the Orthoptera, a group of insecta which comprises locusts, grasshoppers, stick-insects, cockroaches, &c.

Some of the crickets are of considerable economic interest, as they injure various root crops in different countries.

Gryllus lepidus is very destructive at times to pasture land in Victoria; while *Scapteriscus didactylus* Latr., occurring in Hawaii, is said to cause much injury to seed cane by burrowing into it and destroying the eyes. When plants are about 2 feet high these crickets eat into the centre of cane stalks underground, thus destroying same.

These insects are always more abundant on ground inclined to be swampy, but although able to swim well cannot live under water.

The chief remedy for this pest is to flood infested land when practicable, and when the crickets come to the top catch them by hand and drop them into a vessel containing kerosene and water.

When little heaps of fresh earth are noticed betraying the presence of young crickets the land should be hoed, and then spread with a poison bait made of 25 lb. of rice husks or any chopped green stuff, 2 lb. of powdered lead arsenate (or failing that, 5 lb. of copper sulphate), six finely chopped lemons (or 12 drops of lemon essence), and 6 lb. of gur, with 4 gallons of water.

The gur and water should first be mixed, then the lemons, lastly the poison, and the mixture then poured on to the green basis.

Another bait recommended consists of maize and white arsenic. The latter, to amount of 1 lb., is boiled in water with 10 lb. of maize until the latter is soft, water being added when necessary. Grain prepared in this way is buried in the ground at a depth of about 2 inches, and at intervals of about 1 foot.

A little napthalene buried in drills alongside the cane is said to have given good results.

Description.—This insect is 1½ inches long by nearly ¼ inch in width; the body being highly polished like that of a typical wireworm, and practically cylindrical in form, having the head a deep reddish-brown and abdominal segments dark-yellowish. Its front legs, like those of the common mole cricket, resemble short broad hands, projecting laterally on each side of the head, and are strongly toothed and well adapted for digging. The distal extremity of the intermediate tibiæ is armed with two, and the posterior tibiæ with four, large spurs, between which arise the rudimentary tarsi. The end of the abdomen is terminated below with two short pointed protuberances or cerci.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (25th August, 1925) from Mr. E. Jarvis, the Entomologist at Meringa, near Cairns:—

Relative Merits of Paradichlor. and Carbon Bisulphide.

A few notes regarding the value of paradichlor. and carbon bisulphide as effective soil fumigants for controlling our root-eating scarabæid cane grubs will doubtless interest growers who suffer periodically from the ravages of this pest.

The latter and better known insecticide is being employed universally at present for combating the subterranean larvæ and grubs of notable economic insects in various parts of the world, including also ants, termites, wood-boring beetles, aphides, and many other species affecting grain, stored products, &c.

Paradichlor., however, owing to its action in the soil being more lasting than that of carbon bisulphide, has enabled entomologists to bring under control certain formidable insects which had for many years defied all other remedial measures brought against them, and appeared well-nigh invulnerable.

Touching briefly on the success obtained by our Sugar Bureau with this fumigant against grubs of the greyback cockchafer, no further proof of its efficiency is required than that afforded at Woree last year, when a plot of D.1135 injected with this fumigant was found to yield an increase of 13.428 tons of cane as a direct result from such treatment. On this occasion infestation was not excessive, but had grubs chanced to be sufficiently numerous to kill the cane the figures would have been 27.208 tons per acre as a result of the fumigation against nothing at all for the untreated area.

It should be remembered that paradichlor. and carbon bisulphide will both kill cane grubs if applied at the proper time and in the correct manner. Fumes generated by the latter insecticide, however, do not operate in the soil longer than from twenty-four to forty hours, whereas those arising from ¼-oz. injections of paradichlor. are given off for about six to eight weeks. This being so, one should be absolutely sure that the land to be treated with carbon bisulphide be in the right condition, since otherwise (if too wet) the fumes will not have time to reach more than a small percentage of the grubs.

With paradichlor., on the other hand, the soil is almost certain to be in a fit condition at some time or other during the period—following the date of any injection—occupied by evaporation of the chemical, provided that such treatment be carried out during December or January. The individual merits of these fumigants have stood the test of many years' experimentation, both here and in other countries. It is important to bear in mind that paradichlor., when dissolved in any liquid medium, does not exercise its deadly influence for much longer than the time that elapses after fumigation with carbon bisulphide; thus, its chief merit, viz., that of operating efficiently in the soil during a period of several weeks is thereby destroyed, so that by using paradichlor. in solution one would not get the best results from the purchase of this costly fumigant.

As a matter of fact, it is this undoubted advantage possessed by paradichlor. over other soil fumigants that has enabled American entomologists to control the notorious Peach-tree Borer (*Aegeria exitiosa*), whose larvæ are so difficult of access, tunnelling as they do in the roots of these trees. Similarly, when the fumes from injections of the nodules of paradichlor. continue to evaporate for week after week in grub-infested cane land, the toxic vapours can hardly fail to ultimately reach grubs chancing to be ensconced in compact lumps of soil not easily entered by such vapours, or those grubs situated immediately under cane stools, among earth more or less consolidated by pressure due to expansion of the growing plants, where the earth is often a little moister than that moved by cultivation and far more difficult to penetrate.

If we dissolve some nodules of paradichlor. and then allow a drop of the mixture to fall upon a glass slide, the fluid will be seen to have evaporated after two or three minutes, a small portion of the paradichlor. remaining behind in the form of scattered and very minute crystals, which about twenty minutes later will be found to have completely volatilised. When such fluid is injected into the ground these crystals are deposited in that portion of soil moistened by an injection and appear, about twenty-four hours later, in the form of minute glittering specks lying amongst the soil particles. Although taking a little longer to volatilise underground than when fully exposed to air and wind, these crystals, on account of their minute size, would naturally evaporate away very quickly in well-ærated land.

It was shown by experiments conducted in America during 1923 for fumigation of insects affecting stored grain, &c., that when paradichlorobenzene is dissolved in carbon tetrachloride, about 1 per cent. only of the former chemical is given off during evaporation of the carbon tetrachloride, regardless of whether the amount of paradichlor. dissolved be large or small, thus indicating that the toxicity or killing power of the carbon tetrachloride was not greatly changed by such addition. This fumigant is used very largely at present in the same way as carbon bisulphide for combating the same insect pests. Unlike the latter fumigant, however, carbon tetrachloride is not inflammable and if thrown on fire tends to extinguish it. It is insoluble in water but dissolves in alcohol, &c.

It is interesting to note that as presumed by the writer in a previous report ("Australian Sugar Journal," vol. xvii., p. 40) the price of paradichlor. has fallen very considerably during the last few months—from about £160 to £90 per ton. On our experiment plots at Aloomba and Freshwater, in 1924, doses of ⅛ oz. and ¼ oz. of paradichlor. appeared equally effective against cane grubs, so that at £90 per ton the cost at present for treating an acre of cane with ⅛ oz. injections of this chemical would not exceed £3.

Control of *Rhabdocnemis Obscurus.*

Additional consignments of the parasite of this borer (*Ceromasia sphenophorus* Boisd.) were distributed during July and August by the Assistant Entomologist, Mr. A. N. Burns, at Aloomba, Daradgee, and Goondi. The abovementioned liberations consisted of 82 living parasites and about 400 of their puparia; the flies being let go among borer-infested stools, and a breeding box containing the puparia established between cane rows affected by this pest.

At Meerawa, it was encouraging to learn that these useful parasites have commenced breeding naturally and are likely to become well established. Such success is owing largely to the grower concerned being personally interested in this phase of control work, and aiding our efforts in this connection by reserving suitable spots for the tachinids to breed in, at the same time making sure that the cane in such places does not get burnt. On another farm at Highleigh, where similar interest and attention is manifested by the grower, these parasites bid fair to become firmly established, and definite beneficial results from such liberations have proved a stimulus to all parties concerned.

A Promising Grub Fumigant.

On 29th July experiments were started with an insecticide consisting of benzine, containing napthaline in solution, which it was considered might prove a valuable fumigant in connection with cane grub control.

These laboratory tests were carried out against third-stage grubs of *albohirtum* placed in the bottom of cages containing about 10 cubic inches of moist soil, a dose of 1 drachm of the above mixture being poured on the surface soil in each cage.

On the following day all grubs were dead, the dose given having been too large, although amply demonstrating the power of this fumigant.

Mr. R. W. Mungomery, Assistant Entomologist, who was given charge of this experiment, stated in a preliminary report supplied to me that these dead grubs were "in a very flaccid state." All had vomited to a great extent, and one had the rectum protruding about ¼ inch outside the anal orifice, showing this mixture to have the power of upsetting the stomach to a great degree, causing purging as well as vomiting.

On 30th July, 1925, four small cages were stocked as before with grubs, and in this case ½ drachm dose was used on each cage and results noted as follows:—31st July, 1925.—All grubs very sickly and flaccid, but regained somewhat rigid conditions on exposure to fresh air. All showed very little movements, those noted being only in the antennæ and legs, and these were very feeble. 1st August, 1925.—Three grubs were motionless and apparently dead, while the fourth was very weak. 3rd August, 1925.—The effects of the napthaline began to show up and their bodies turned a pinkish colour. 4th August, 1925.—All the grubs were dead and decomposition beginning to take place.

At the same time as the commencement of this last experiment, *i.e.*, 30th July, 1925, four large cages holding about 48 cubic inches of soil were stocked with third-stage *albohirtum* grubs as before and treated each with a 1-drachm dose of the napthaline-benzine solution.

On the following day all grubs were alive, but very sickly, and the vomiting and purging condition was noticeable in two. Three grubs were found to be dead on 3rd August, 1925, being pinkish and discolouring, and the fourth was dead on 4th August, 1925, which represents a mortality of 100 per cent. in five days in these two latter series of experiments.

At the conclusion of these experiments the odour of napthaline was still fairly strong in the soil and would still have had some effect as an insecticide.

INVESTIGATION OF PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (22nd August, 1925) from Mr. W. Cottrell-Dormer, who is investigating pests and diseases:—

Cairns District.

Since returning to this district, I have concentrated most of my work in the investigation of Gumming disease, the outbreak of which in the Aloomba district was observed on my last visit. As far as my inspections to date show, it would appear that the disease is restricted to the cane lying in that tract of country bounded on the west by the railway line running from the Aloomba Station to the Behana Creek bridge, on the south by Behana Creek, and on the east and north by the Mulgrave River. However, this must not by any means be taken as a final statement of the case, since my inspections have not included country situated much more than half a mile from these boundaries in any direction and a great number of the canefields have been already harvested, which precludes the detection of the disease in these paddocks for some months; furthermore, small patches of the disease may occur in a field and be missed in a single visit. At all events the outbreak is more extensive than was at first thought, and this area at least should, for the present, be regarded by those outside as a perfectly unsuitable source for plants, while those within this area should at once attempt to replace the present stock, with healthy material from outside farms, though preferably not from other districts. D.1135 and H.Q.426 should be discarded in favour of B.147 on the poorer soils, and only Badila grown on the richer lands of the infected area. Q.813 is a gum-resistant cane, but will not stand up to the heavy winds common to Aloomba. E.K.28, H.109, Pompey, and H.Q.458, all of which are tending to become popular in this district, must be considered as unsuitable for a gummed locality, being too prone to infection. A meeting will be held on one of the gummed farms on Sunday, the 23rd instant, when the position will be put before the growers and advice and instruction in the detection of Gumming disease given. I cannot yet give a complete summing-up of the situation, so this will have to stand over until my next report.

South Johnstone Experiment Station.

A short visit was paid during last week to the South Johnstone Sugar Experiment Station in connection with matters pertaining to seedling raising and cane diseases. The varieties which have been allotted for distribution were inspected. These appear to be free from serious disease.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

ENTOMOLOGIST'S ADVICE FOR SEPTEMBER.

"Army Worms" on the War Path.

Caterpillars of the so-called "Army Worm" (*Cirphis unipuncta* Haw.) have commenced operations, and during this month growers should be on the lookout for the occurrence of this pest on areas under young ratoon and plant cane.

Low-lying flats, bordering river banks are very liable to invasion, and in severe infestations, damage to or complete destruction of the heart-leaves becomes a noticeable feature of attack.

These caterpillars feed at night-time, hiding during the day among the unfolding leaves in centre of stools; their whereabouts, however, being invariably betrayed by numerous pellets of excreta or powdery fragments of same scattered among the central leaves and on the ground close to stems of affected plants.

Control measures are seldom necessary, unless in cases of severe infestation, as these caterpillars are attacked by many species of hymenopterous and dipterous parasites, and also by a virulent disease known as "wilt," which occasionally destroys 90 per cent. or more of the larvæ. Owing to the combined activities of such enemies the second and succeeding broods of this moth-pest are usually rendered harmless, on account of the proportionate increase of its parasitic foes.

When cane is severely damaged, while the caterpillars are found to be still small or half-grown a poison-bait consisting of the following ingredients is said to have given good results:—Bran, 20 lb.; Paris green, 1 lb.; syrup, 2 quarts; orange or lemon, three fruits (finely ground); water, 2¾ gallons. The various components should be well mixed together to form a fairly thick mash, fragments of which, about the size of a walnut, are scattered between cane rows close to the plants in the early evening, as these caterpillars feed at night-time. Another good method is to spray badly eaten plants with lead arsenate in the proportion of 1 to 2 lb. arsenate to 50 gallons of water. This strength if correctly made will not burn the foliage.

Protect Your Beneficial Insects.

Soil-frequenting larvæ of insect friends of the grower, which are parasitic or predaceous on cane grubs, should not be destroyed.

Some of the commonest of these may be easily recognised by the brief descriptions and illustrations given in the "Australian Sugar Journal" in vol. xvi., p. 830 (March, 1925); and the "Queensland Agricultural Journal," vol. xxiii., pp. 273, 274).

PLATE 58.—"ARMY WORM" CATERPILLARS
(About three-quarters grown).

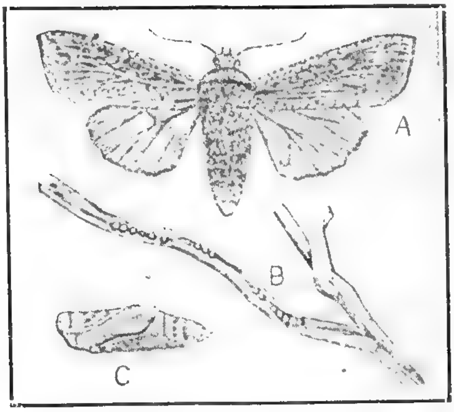


Plate 59.—A. Moth of "Army Worm"
B. Eggs of same
C. Pupa of same
(All Natural Size).

The Beetle-Borer Wakes Up.

As the season advances, accompanied by milder temperatures, the activity of the weevil-borer of cane is becoming gradually more noticeable. Inspection of cane, growing in low-lying situations, should not be overlooked, and growers discovering evidence of attack at the basal portion of sticks should lose no time in communicating with the Entomologist at Meringa Laboratory, in order that tachinid parasites of this pest may be released on such borer-affected areas.

Fumigating Grubs and Pupæ of the Greyback Cockchafer.

Most growers are familiar with the pupal stage of this beetle, when it appears as a dark reddish-brown, angulated object, of somewhat top-shaped form, sharply ridged on the abdomen, the extremity of which bears a couple of large blunt spines. This pupa, about $1\frac{1}{2}$ by $\frac{3}{4}$ of an inch in size, lies in an ovate chamber formed in the ground by the grub at depths varying from 1 to 2 feet, and usually out of reach of the plough. These pupæ can, if desired, be killed by fumigation with carbon bisulphide, the fumes of which are able to penetrate the walls of the pupal chambers.

FIELD REPORTS.

The Northern Field Assistant, Mr. E. H. Osborn, reports:—

Bowen.

Very dry conditions prevailed. Among many good blocks of cane were three small paddocks of Badila grown by Mr. C. C. Boulter, showing extremely heavy growth and prolific stools, while some Tableland Badila near by had also made good headway. As green manure and fertilisers are also being tried out on this farm, results will be worth noting. Another field showing very heavy even growth and good cultivation was a 6-acre block of N.G.15 belonging to Mr. H. Livesey.

Disease.—In a former report mention was made of Mosaic seen in some plant B.208, alongside of which a plot of corn was also carrying the suggestive leaf symptoms.

The ratoons now show a much heavier infection, being easily noticed at quite a distance. At another farm, about 2 miles away, a block of eight months' old plant B.208 was noticed to be very diseased, and upon inquiry it was learnt that the seed had been obtained from the first-mentioned farm. Surely this is enough to make growers realise how imperative it is that only the very best of seed should be used.

Burdekin (including Home Hill).

Here the conditions were very dry, no rain having fallen since the middle of March. All plants were busy watering. Early estimates for the district were easily a record, but owing to dry weather these figures may be materially reduced, for the young cane may have to be watered at the expense of the present crop. At each side of the river some remarkably good plant cane was seen, but ratoons were mostly poor.

Probably 80 per cent. of young cane had been planted and had made a very fair strike.

Some of the land had broken up very lumpily, necessitating much work to bring it into good planting tilth. Disc harrowing in this connection was useful.

Many growers have ploughed in green manure, and all seem satisfied with the results, claiming that the ground worked up much better. It certainly should retain the moisture better.

Cane Varieties.—Among newer canes some splendid E.K.28 was noticed, consisting in most cases of fair stools of thick heavy erect canes up to 9 and 10 feet in length. Many farmers remarked how very well it stood up to irrigation methods. As this cane has been planted out to a fairly large extent this year and has struck well its returns under local conditions will be interesting.

Some very heavy H.Q.458 and Q.903 (May plant) were remarked at Mr. M. Coyne's Nartham Farm. These were planted adjacent to M.1900, B.208, and H.Q.426, and the former cane was a far heavier cropper.

Mr. Coyne says that these two canes gave him good density returns when cut about October. Q.813 is also doing fairly well upon the poorer soils—one splendid crop of it going probably 40 tons per acre and standing well up was noticed at Messrs. Stapleton Bros. of Home Hill.

Pests.—White ants are very serious pests in some parts of the area. In the vicinity of one farm are growing very many heavy trees such as Blue Gum, Moreton Bay, Blackbutt, which were noticed to have many odd dead limbs eaten right out, while several large trees were but a shell.

Upon the adjoining farm much damage had been done in a fine crop of Badila, many sets having been eaten out before germinating, while in most stools the dead heart proclaimed the presence of ants. Very many stalks looked all right, but when cut into after closer examination were found to be absolutely eaten right out from the butt to the cabbage.

One grower said that he replanted many sets as many as four times last year. Further away from the timber belt was seen a paddock of eight-months' old plant cane. In December the owners, after noticing many dead hearts, pulled them out, pouring down the opening a small dose made up from three-quarters of a kerosene tin of molasses, half a fruit tin of arsenic, and about half a jam tin of caustic soda. (It might be said that a little water was added to help the caustic dissolve the arsenic.) This work occupied two men two weeks, and at the same time all the adjoining fence posts and timber were also poisoned. At the present time a good crop seems assured, and the owners aver that, had this not been carried out, the whole crop would have been lost.

Grubs.—These have been rather noticeable this year, principally near Plantation Creek. One grower procured a pump and some carbon bisulphide and injected each side of the stools early in April, with the result that his crop looks remarkably well, despite the fact that he had left such treatment rather late. He intends to ratoon again, but will fumigate a few weeks after the beetles emerge in December.

Diseases.—Leaf Stripe seemed to be more prevalent in the area, especially upon the northern side of the river, than the writer had noted before, the variety chiefly affected being B.208. Some really splendid crops of this cane were very heavily infected.

Some small variety plots, such as H.146, H.227, and Rappeo, were also seen to be suffering. These are all to be discarded. On another farm two lines of 7R.428 (Pompey) were growing among H.Q.426 and B.208. The B.208 was heavily infected although only eight months old, and upon close examination one stool of Pompey also showed stripe, evidently from the B.208.

Mosaic was noticed in some H.Q.426, also in a few stools of Rappoe, in the Airedale area. The owner had grown corn near the H.Q.426, and it is probable that the disease was transmitted from this crop to the cane.

Top Rot does not seem to have done as much damage this season as in other years.

Invicta Mill (Giru).

From January until March this area registered 40.62 inches of rain against 27.94 inches at Ayr, but since then no rain had fallen. Generally the country seen looked remarkably well, and some magnificent cane was being harvested, several crops of over 50 tons per acre Badila being in evidence. Q.813 and E.K.28 also seemed to be doing well, although only in small lots; some of the latter looked a picture with its erect heavy growth. Some very good B.208 was also seen to have

grown well, but carries too much Leaf Stripe disease. One block in particular had suffered very much, the sticks in many cases being pithy and carrying pipes, while the density was too low to be payable. Mosaic was also seen in this paddock and in a couple of stools of first ratoons of the same variety on another farm close by. Some distance away Stripe was noticed in a few rows of Imperial and Mosaic in several stools of Plant B.208. Quite near the latter was a small plot of stunted-looking corn growing with Mosaic Leaf markings very distinct. Local growers would be well advised to discard these two varieties, and after burning off plough out the ratoons, planting up with some more resistant variety such as Goru, Q.813, E.K.28, Badila, &c. Otherwise their loss may become serious, and, with the present price of sugar, that would be fatal.

The mill was busy operating upon a record crop of about 70,000 tons.

Giru has progressed wonderfully, and now that hotel accommodation is expected in the near future the prosperity of the district should become better known.

24th July, 1925.

Ingham Railway Line.

At Rollingstone the prolonged dry spell of practically three months had caused yellowing of the cane upon the poorer forest areas, but upon the lower lying portions adjoining the creeks some good patches of cane were seen, notably some first ratoon Badila near Rollingstone Creek, while at Moongabulla some second ratoon H.Q.426 showed splendid growth upon some alluvial soil.

Bambaroo.

Although this area has also had a dry time lately, the cane looked better than expected, some good crops of plant being noticed in several places, but the ratoons were only middling.

Principal varieties seen were H.Q.426, Badila, H.Q.409, Goru, and Q.813, the quantity of H.Q.409 and Q.813 having increased considerably during the past two years. Both do remarkably well hereabouts, but H.Q.409 is a very early and prolific arrower, and most probably would want cutting ere too old, while Q.813 seems to keep its density very well. Of the newer varieties some thirteen months old E.K.28, carrying about 12 feet of thick cane and a fair stool, was seen upon Mr. Hecht's farm. This looks remarkably healthy. Nearby some H.146 and E.K.1 were also growing vigorously. The latter lies down too much in this class of soil (creek bank) and a certain percentage rots, while the former (H.146) has not too heathy a looking leaf to be satisfactory.

Further up the line at Waterview, where the cane-killing weed was reported to have caused some damage, many dead stools were seen, but of the weed itself no signs were then noticed. Probably it will appear again early in the year.

In the area (Waterview) some minor damage had been caused by grubs, but not to a large degree.

Herbert River.

This district was visited about the second week in June, the weather conditions then being very dry, for to date only 54.95 inches of rain had fallen.

Ingham is certainly growing very rapidly, many new shops and residences having been erected quite lately, most of the former of a substantial character. In the outside area a good telephone system is being installed.

Between the Macknade cane area and Halifax a traffic bridge across the river is now being constructed. In general the whole area seems prosperous; both of the fine local mills were very busy crushing and each expected to handle a record crop.

Varieties.—Among approved canes now grown in this area, H.Q.409 is favoured. It has been planted extensively throughout the district, mostly however in land that is not rich enough for Badila. Very good returns are claimed for it; one Macnade grower expects to cut a 20-ton crop of second ratoon following up a 40-ton and 25-ton crop of plant and first ratoon, respectively. His paddocks (fairly stiff) had been previously limed and green manured, also he makes a point of ploughing in trash when practicable. This cane is a very early arrower, and if paid for upon its density figures throughout the season might not be so satisfactory. Its freedom from Gumming disease is doubtful.

Green Goru in one or two cases was giving a good crop, but this also seems to be a cane very liable to pick up disease. The writer saw crops of Q.813 upon very poor ground looking very well, in one place comparing very favourably with Korpi

planted alongside, but several months earlier. So far it is a clean cane and in a district like the Herbert should give good returns upon medium to poor soils. Being such a splendid striking cane, too, adds greatly to its value.

Disease.—Gumming at the time of my visit did not seem as much in evidence as in former years.

Grubs were noticed in several places, but although one or two farms have suffered, yet in general the damage does not seem to be as much as in other years.

Borers were seen in several places, but have not caused a great amount of damage. Growers are reminded that the Government Entomologist at Meringa (Mr. E. Jarvis) is at all times ready to give any advice in connection with this or any other matter connected with pests.

Innisfail.

When this splendid area was visited early in July, very good weather conditions were being met with, and the crops in general looked very well indeed. A very large area of land was being planted, the soil in most cases being in a very good condition. Several paddocks in Daradgee planted a short time previously were coming on well. According to individual growers, crops were cutting well up to estimates, and some very heavy ones were then being harvested. Naturally losses from grub damage were spoken of, and it seems that, although individual growers have suffered severe losses, the whole damage will not amount to a very large tonnage.

21st August, 1925.

South Johnstone.

About 60,000 tons had then been crushed, the density of which was gradually improving. Crops are not as heavy as last year. This is accounted for by the continuous rain followed by cool weather in the earlier part of the year, also by the fact that late cut cane has made such indifferent growth that a very large proportion of it will not be harvested.

Borers and grubs also are worse than in previous years, the latter accounting for heavy losses in widely scattered parts of the district. Nerada on the 2-foot Government line also shows much loss. Borer damage seemed at its worst upon one area on the main tramline to Japoon, for although Tachinid flies had been twice previously released by the staff of the Meringa Laboratory, a large fire had evidently destroyed their breeding places. Subsequently very heavy losses occurred in the newer growth of cane, portions being absolutely worthless.

Very little early planting was noticed, but many growers were then preparing.

It was interesting to see the many substantial houses and barracks that are now being erected.

The township is also growing gradually, but when the size of the mill is considered it yet has a very long way to go. What is badly wanted is hotel accommodation.

Excellent drainage on one farm at Japoon has been a great factor, and goes to prove how very necessary adequate draining is in seasons like the present. Over and over again the writer sees improvement on farms that are being drained. It stands to reason that without them it is impossible for the cane to give best results in such a wet district as Innisfail.

El Arish (Soldiers' Settlement).

This area is going ahead steadily, and this season's output should easily beat last year's. Numerous new dwellings were noticed upon farms, and several cane-cutters' barracks were also in evidence, while a telephone system is now being installed. As the main North Coast Railway passes through this busy little centre the area is sure to commend itself to sugar-growers. Part of the cane will go to the Tully Mill this year, with a probability of the entire crop going there in 1926.

Varieties.—Badila is, of course, the main cane here, but small quantities of H.Q.426, Q.813, 7 R.428 (Pompey), Goru, and E.K.28 were noticed. On the reddish stoney soils adjacent to the hills some remarkably good plant, first and second ratoons were seen. Some of the young plant cane hereabouts looked particularly fine, carrying a beautiful dark green top.

Several growers were inquiring for Q.813 for heavy poor ground. This cane should give better results than Badila now does. Goru, if obtained from clean healthy seed, should also do well here. Clark's Seedling, being so liable to disease, cannot be recommended.

So far hardly any manuring has been carried out, for nearly all the farms are still under the "stump."

Diseases.—A couple of stools of N.G.15 carrying Leaf Scald were seen, and pointed out to growers.

Pests.—Grub damage to a small extent was also noticed for the first time.

Tully.

This area was having a fine spell when visited. Very rapid progress was being made everywhere. A fine town is being formed. Great progress is being made with the mill, and a medium crushing will be put through, while for next year probably 6,000 acres should be harvested. The tramway system seems to be a very complete one, and the millyard with its very numerous 2-foot lines and also 3 feet 6 inches Government tracks is in accordance with the fine mill. All through the area new land had either been planted or was in its preparatory stage. Of the cane planted the strike seemed to be medium, but the weather conditions then were on the cold side. A good deal of activity was seen on the Government blocks recently balloted for. The main cane land is situated on the southern side of the Tully, extending from Hugh Henry's (Bellenden) on the western side of the railway to Steve Theodore's on the eastern side, a distance of, say, 4 miles, and following the river down. Right throughout this particular area some very fine Badila is growing, some early planted cane on both the Henry's farms being very heavy. Some of the best, though, was noticed on Mr. S. Theodore's, some ten months' old ratoons looking particularly healthy.

Crossing the river here (at McBryde's Crossing) a return was made along the northern side going through, among other farms, the area formerly part of Mrs. Dean's. Among different farms here are probably 100 acres of young plant cane, principally owned by Italians, and all showing good work. This is mostly low-lying ground and takes plenty of work to keep clean. Nearer to the mill the cane (Badila) upon some of the low-lying, yellowish, stiff soils has made very indifferent growth. This land wants draining and liming. Several growers realise this, and are ploughing out and liming. Coupled with this grubs have also done a certain amount of damage, more especially in low-lying places. Most probably, owing to poor soil conditions, the cane roots did not develop well and could not penetrate sufficiently the bottom soil to give the cane enough resistance to withstand grub attack.

Varieties.—At present Badila is the main cane, but it is doubtful if parts of the area will grow this variety successfully, and upon these areas Q.813 and the Gorus might give better results. Q.813 is a shallow rooter and requires planting in a fairly deep drill with a fair amount of covering after it has stooled out (not before).

On the poorer areas likely to suffer from grubs D.1135 should do well, but whatever canes are used it is imperative that they are from a district free from gum. On no account should any cane from the Herbert River be planted, for if gum once gets a start in the low-lying badly-drained lands the resultant losses will be very serious.

Mourliyan.

Crushing was proceeding very satisfactorily at this mill, a record run having been experienced just before my visit, when 5,185 tons of cane had been crushed the previous week.

The c.c.s. was 12.6 and steadily improving. The cane going into the mill, too, was the cleanest noticed in the district, and the crops were cutting well up to the estimate. In the dark-red soil some splendid young plant was noticed looking extremely healthy. As a whole, the late cut cane did not look at its best, but compared well with the same class seen elsewhere.

Q.813 was still giving good returns; for instance, some ratoons were going 13.2 when the mill average was 12.5 (Badila), and at an earlier date the two (Q.813 and Badila) were upon the same mark, *i.e.*, 12.4.

Babinda.

Owing to too much rain in the growing portion of the season, and subsequent cold conditions, the growth of cane did not come up to earlier estimates. This was particularly so in the late cane, quite a portion of which will hardly be forward enough to harvest. Despite this, some really good cane was to be seen. Bartle Frere, as usual, looked very fine, and of its cane-growing qualities there can be no doubt; the southern side of the Russell at Buckland's also had very heavy cane, and also the portion formerly known as the Queensland National Bank property. A fair

area of land had either been planted or was being prepared then. Of the former the strike was very slow, caused no doubt by cool weather conditions.

Varieties.—In this area Badila is, of course, the main cane; of the others Q.813 was giving good results on a paddock of Dr. Knowles. The cane was cutting at the rate of about 30 tons per acre and its density was 1½ per cent. over the mill average. Considering that the cane was barely twelve months old, and that a fair proportion of the mill's average was from standover cane, the result is promising. Unfortunately, the Q.813 was lying down badly, probably because it was not planted deeply enough, and also because it had been badly knocked about by heavy wind earlier in the year.

H.Q. 458, H.Q. 409, and Oba Badila were noticed upon Mr. A. Mayer's red soil farm at Bartle Frere. The lastnamed (first ratoons) was looking very well, but the two others had grown too quickly and were too straggly. This class of soil is evidently too good for such quick-growing canes.

Pests.—Grubs have done more damage in the area than at any previous time, for, although the actual loss was only severe in a few places, yet on very many farms the cane received a severe check, and the subsequent cool weather did not do it any good.

Borers and Rats.—These also did a certain amount of damage, but not above the average.

Diseases.—Leaf scald was only seen to a small extent, but probably the effects of it were not noticed so much on account of the quantity of cane showing "yellowing off" from grubs.

The Southern Field Assistant, Mr. J. C. Murray, reports (*25th July*, 1925):—

Childers.

Cane here is backward, especially late cut ratoons. Heavy rains fell during June, but there will be little benefit from these owing to low soil temperature. Although the mills have reduced considerably their original estimates, the crushing will still be a very fair one.

There is a considerable amount of agricultural activity in this district, the farmers getting through their farm work prior to the rush of the season. Tractors are coming into more general use and the growers are taking a keen interest in new types of implements, especially those calculated to lower in any way the cost of production. Two new types of implement have been demonstrated recently in the Childers district—a rotary cultivator attached to Fordson tractor and a plough for working in trash and green manures. The latter implement is an excellent one and supplies a means whereby cane trash and dry cowpea or beans can be effectually ploughed under.

The practice of green manuring is extending, and it is now quite common to see fields of legumes growing for this purpose, whereas five or six years ago very few growers practised green manuring. Cane varieties making a good showing in the Childers district are Q.813, M.55, Pompey (7 R.428), M.1900, and H.Q.285. Of these the firstnamed looks best. The C.S.R. Company has variety plots at various points in the district, but as yet the canes from these have not been tried under field conditions. Canes undergoing trial by the company include Korpi, a variety that has done well in North Queensland.

The most prevalent disease is the common root-rot or "peg-leg." As this has been discussed several times previously, there is no occasion to repeat the recommendations, especially as growers are doing a great deal more crop rotation than hitherto, a factor which goes a long way towards minimising the damage done by fungoid parasites. Gumming was noticed in several blocks of D.1135. Where growers know they have gum in a block of cane they should always sterilise the cutters' knives before leaving that block. The men are themselves asked to co-operate with the farmers in this respect, for gumming is a very serious sugar-cane disease. A tiny drop of gum contains thousands of organisms, so it is plain that the disease can be readily carried on a cane knife.

The most successful fertilising results are being obtained from potash and bonemeal.

Booyal.

The cane here has made good growth considering the adverse weather conditions that prevailed during the autumn. Some standover cane will cut as high as 30 tons per acre. Farmers are experiencing no trouble with pests or diseases. Varieties being tried include Q.1098, H.Q.77, J.247, Petite Senneville, E.K.28, E.K.2, Q.970,

E.K.1, Black Innis, H.Q.285, Q.813, N.G.40, Meerah, and M.1900 Seedling. Of these, the canes making the best showing are Q.813, H.Q.285, Meerah, and Petite Senneville. The teacher in charge of the local school intends to establish a small experiment plot for the benefit of his scholars.

A sample of a fairly typical soil, taken at last visit, shows to be fair in humus, nitrogen, and potash, low in phosphoric acid, and fairly high in lime.

Maryborough.

Although the crops here are not as heavy as last year, the mill anticipates a crushing a little above the average. The Mary River flats are very productive, and growers of cane on the banks of the river have crops that should harvest over 20 tons per acre. The crop would have been heavier, but the late cut ratoons are poor.

Farmers are doing much better and are becoming more up to date in their methods than a few years back. Mechanical traction for ploughing is coming into use, and growers are taking a greater interest in experimental work than hitherto.

Older varieties of cane are gradually being discarded, canes with a higher sugar content and greater resistance to disease taking their place. Two varieties are giving outstanding results: M.1900 Seedling and Q.813. Both are useful for the grower and the miller alike, the latter finding them good canes to treat and the grower finding that he gets a high percentage of c.c.s. from them.

"Gumming" is showing in the striped Singapore. Any farmers observing this disease in their crops should take precaution against spreading it during the crushing.

To get the best results this season, farmers are recommended to avoid cutting immature cane and not to cut more than their allotment. During the coming season, if a farmer notices that his ratoons are shy, he will be able to give them a start by a light top-dressing of sulphate of ammonia, provided, of course, that dry weather is not prevailing. In ratooning, while opinions differ as to the best method, the main item is to get the interspace thoroughly worked up. Farmers would do well to harvest their best varieties in September and October. Old ratoons would be best cut late in the season, and early maturing varieties or canes that the growers intend to replace would be best cut early.

Pialba.

The cane appears to be generally rather backward. Farmers have had plenty of rain, but no doubt the late season last year prevented their doing as much cultivation as they would have liked, especially those with long haulage. Some of the standover crops are heavy and in good condition. Some varieties are showing a tendency to arrow, particularly H.Q.285.

Pialba farmers, especially those back from the coast a few miles, are strongly recommended to carry out green manuring. They will find the light loams immensely improved by this process. Assume, for instance, that they allowed the peas (if cowpea were grown) to mature. They can get a good price for the seed, and can work the top and the roots into the soil, where they quickly decay and form humus and act as a nitrogen source.

Yerra.

The cane is remarkably healthy at present, and some of the crops are heavy. Very slight frosts have occurred, although nothing heavy enough to affect the cane. The farmers here are growing the recommended varieties and gradually discarding the useless ones. The variety Petite Senneville is a cane that has made about the best growth. M.1900, Q.813, and Black Innis show good crops also. Good strikes of D.1135, too, are in evidence.

20th August, 1925.

Mount Bauple.

Very fair crops are growing on this area this season; in fact, some of the cane to be seen in the southern district is showing at Bauple. The writer has in mind particularly Q.813, H.Q.285, M.1900 Seedling, and E.K.28. At present there is no new cane that could be recommended to displace the staple ones.

A matter towards which the growers' attention is directed, however, is the presence of considerable patches of gummed cane in their district. The two most effective measures of control for this disease (gumming) are plant selection and cane knife sterilisation during the cutting season. As an illustration of the importance of the latter, the following will show:—An examination of a field of cane showed abundant evidence of gum. The owner was starting on this block,

and from that point the cutters would carry on right through the farm, with the inevitable result that in a few years the disease would be in almost every stool. The farmers are earnestly requested to dip the set of knives in a drum of boiling water after each block is cut, irrespective of whether they have noticed the disease present or not. In the writer's opinion cutters are the greatest, though unconscious, distributors of gumming disease.

Agricultural activity in the Mount Bauple district is extending, especially in the direction of banana culture. It is surprising that the rich eastern slopes of Mount Bauple have not been cleared before now for bananas, as they appear to be ideally situated for this fruit.

Crushing was in full swing. A good type of labour was offering, and the season should assist the district one step more along the road of progress.

Nambour.

Whenever one comes to the Nambour district there is always an impression of freshness and prosperity, a feeling that one day there will be a great city with outlying orchards, farms, and sanatoria, a place where tourists will come to enjoy the wonderful beaches and equally splendid mountain scenery.

Frosts have caused considerable damage, but the frosted blocks are being milled as rapidly as possible, so that it is unlikely the farmers affected will suffer serious financial loss. Unfortunately, some cane intended for plants has been seriously affected, a circumstance that will probably compel the growers to buy plants elsewhere. Taking the cane on the whole the crops are good. The cane exhibit at the Nambour Show was well up to standard. Some of the M.1900 Seedling exhibited, grown on the high lands west of Nambour, showed phenomenal growth. Growers are strongly advised to keep working against the spread of disease.

Most farmers are familiar with the primary symptoms of the two major diseases, but co-operation is the only thing that will free a district from pests and diseases and bring about a 100 per cent. efficiency.

Mosaic disease can be very readily controlled by plant selection, and the farmers could soon rid themselves of what is present in this district if they tackle it wholeheartedly next planting season. Advices from Louisiana, U.S.A., show that Mosaic disease cane cause very heavy losses if not checked.

Beenleigh.

The crops here look well, and the small mills scattered about the district will have fair crushings. Many of the farmers are leaving canegrowing in favour of other crops such as bananas, potatoes, and arrowroot, all of which are profitable at present. Those continuing to grow cane will find they will do better if they plant Q.813 more extensively than at present. M.1900 Seedling also does very well here at present, also H.Q.285. These canes also give the small mills, which are without shredders and are not heavy roller plants, a better chance.

GUTTA PERCHA TREE *(EXCAECARIA PARVIFOLIA)* AND ITS EFFECTS ON SHEEP.

The Inspector of Stock at Normanton, North Queensland (Mr. D. A. Logan), has recently reported to the Department as follows:—

"I have inspected a mob of travelling sheep, J. S. Kirby and Son, owners, travelling from the Winton district to Inverleigh West (late Wernadinga).

"When between Wurung and Inverleigh West some of the sheep developed a sickness with the following symptoms:—The sheep lost all sense of sight and hearing, would bleat for their mates while alongside of them, would sometimes travel round in a circle and drop on their sides and lie there. They would chew the cud but not swallow the food, as some would fall out of the mouth; would sometimes walk backwards from the other sheep. Not many deaths occurred, but sheep that died bucked in the air and fell dead. Some also frothed at the mouth.

"Sheep, when affected with the sickness, would not travel and consequently had to be left behind, while the strong sheep travelled on. The internal organs of the sheep appeared quite healthy on examination.

"The mob comprised 6,887 ewes, and out of this number about 300 were affected. The sheep had been eating Gutta Percha leaves, and it is thought that these leaves may have been the cause of the sickness, as it did not appear among the sheep until they commenced to eat the leaves of the Gutta Percha.

"Under separate cover I am forwarding you a few of the leaves, which have a drastic effect on the human eye and mouth, if the milky sap of the same happens to come in contact with them.

"I may state that the sheep in question are the first to arrive in the Gulf, and will be followed by several mobs within the next twelve months."

The specimens of leaves referred to were handed to the Government Botanist (Mr. C. T. White), who identified them as the leaves of the Gutta Percha Tree (*Excœcaria parvifolia*), and reported as follows:—

I have no doubt that the leaves of the Gutta Percha Tree (*Excœcaria parvifolia*) are responsible for the trouble among travelling sheep reported by Stock Inspector J. A. Logan, of Normanton.

The members of the genus *Excœcaria*, to which the North Queensland Gutta Percha belongs, all possess a very acrid blistering milky sap and for this reason are variously known as "Blind-your-eyes" and "Poison Trees." When leaves and twigs are eaten by stock the sap has a blistering effect on the inner membranes and may cause sickness and in some cases death.

It is common practice with school children to chew the dried sap of the Moreton Bay and other fig trees, and on p. 87 of Bailey and Gordon's "Plants Reputed Poisonous to Stock," there will be found a reference to a child having mistaken the Milky Mangrove (*Excœcaria Agallocha*) for a fig-tree and chewed some of the sap with very nearly fatal results.

CHEESE MAKING.

A. R. WILKIN, Instructor in Cheese Making.*

My duty being to closely watch the cheese industry and assist it in any way I can, I am very pleased to state that I find that a very satisfactory advance has been made in the quality of the cheese generally this year, and there is no doubt the great majority of factory managers and cheesemakers are thoroughly acquainted with their work. This is borne out in the grading, for although their cheese may grade second they invariably procure full points for manufacture, but cut down for flavour, showing that they have done their part of the work intelligently. Still the general results are not satisfactory.

This brings us to a matter where there appears to be divided opinions, and summed up it comes to this: Only with a proper system of raising aeration and cooling of milk on the farms can it be delivered to the factory in such a condition that the cheese maker can guarantee to make a 92 per cent. grade cheese, or is it better to install a pasteurising plant which gives you an assured control of the milk and makes it possible for the cheese maker to turn out 99 per cent. of first grade cheese.

With our erratic seasons and the many different kinds of pastures which include such varieties of highly flavoured weeds, I am convinced that we will never get rid of weedy and other bad flavours in the cheese without the aid of pasteurisation. Hence my advice is, install them as quickly as you can.

Whilst on this subject I may say that during the past some unpasteurised cheese of second grade quality brought a higher price in London than pasteurised cheese grading 94 points. This, to my idea, is no criterion, but very detrimental to the industry for this reason—the person who bought the second grade cheese would be dissatisfied with his purchase and not likely to advertise our stuff, whereas the purchaser of the pasteurised cheese would be quite satisfied and come again; and what is more, if all our factories have pasteurisers we could export 90 per cent. of our cheese under the Kangaroo Brand and the price overseas would immediately advance the same as the butter has done and put the industry on a very much better footing.

I did not intend dealing with the manufacturing side of the question, but as one defect has been quite common in our cheese—viz., uneven colour—a word or two here may be useful. This defect appears in both pasteurised and unpasteurised cheese.

Discolouration is caused by injurious bacteria acting upon the natural and artificial colouring in the cheese. Inferior colour, keeping milk at too high a temperature, insufficient acid, too much acid at drawing off whey, curd packed too high when cheddaring, if not turned often enough, salting at too high a temperature, uneven mixing of salt in body of curd, quick and heavy pressing, too high a temperature in curing room, are the principal causes.

* In a paper read before the Butter and Cheese Factory Managers' Conference at Brisbane, 24th June, 1925.

FRUIT FLY INVESTIGATION.

ENTOMOLOGIST'S REPORT.

Mr. Hubert Jarvis, Entomologist investigating the Fruit Fly problem in the Stanthorpe District, has submitted the following Report covering observations and activities during the months of June and July, 1925.

FRUIT FLY.

Field Experiments (Winter Life).

(1) The Departmental Fruit Fly cages, erected over fruit trees in the orchard of Mr. J. W. Barlow, and referred to in my previous reports, have, during the months of June and July, been periodically examined.

On 1st June three fruit flies were still found to be alive in Cage No. 1 (in which forty fruit flies were liberated in the autumn); two of these flies were crawling over the fruit (that had been previously placed on the ground) and were in a "crippled" condition; and one fly was resting on the wire gauze, covering the cage. As there was a large quantity of maggot-infested fruit placed in this cage it is probable that the two "crippled" fruit flies had developed from this source.

On 8th June these cages were again examined and no fruit flies were found therein alive; six living maggots were about half grown and very sluggish.

The soil-temperature at a depth of 2 inches was, at this time, about 38 degrees Fahr. at 11 a.m.

(2) On 20th June Inspector St. J. Pratt submitted an apple harbouring a living and nearly full-grown maggot. The fruit was placed in the Insectary in a breeding jar, and the maggot subsequently perished, owing, presumably, to the very cold climatic conditions.

Several very severe frosts were experienced during the month of June, more particularly during the early part of the month, the 5th, 6th, 7th, 8th registering 18 degrees Fahr., 19 degrees Fahr., 17 degrees Fahr., and 22 degrees Fahr., respectively.

The soil-temperature throughout the winter months in the Granite Belt remains very low, and must retard, and in fact stop, all fruit fly maggot growth; and this low temperature, sustained for many weeks at a stretch, is, in my opinion, an important factor in the destruction of a large percentage of fruit fly maggots and puparia, should such be present in the soil in the Stanthorpe district during the winter months.

Fruit Cold Storage and Fruit Fly.

In relation to the influence of low temperatures on the maggots and puparia of the fruit fly *C. tryoni*, the subjecting artificially of such maggots and puparia to cold storage temperature, with a view to their destruction, has already been made a matter of investigation, both in this country and also in other parts of the world, with most encouraging results.

The cold storage of fly-stung apples from this district, by Mr. A. H. Paget in 1922, and later by the Department of Agriculture under the supervision of Mr. H. Tryon, Government Entomologist, gave very satisfactory results, both from the point of view of the destruction of all eggs and maggots of the fruit fly, and also of the freedom of possible consequent impairment of the keeping and marketable quality of the fruit.

In my report, 16th May, 1922, the importance of this possible control measure was stressed, and I am still of the opinion that (provided it is financially practicable) a cold storage plant, of generous capacity, would be an invaluable asset to the Granite Belt, and would go a long way towards controlling the fruit fly.

We are now fairly certain the fly travels into this district by flight, also that it is breeding in very many native fruits. This being so, we must look to some practical means of safeguarding the condition of our fruit, recently "stung," or menaced by fruit fly attack, prior to its being sent out of the district. Cold storage seems to go far towards meeting the requirement, and we are at present certain of this in regard to apples. We have, however, little or no data on the effect of low temperatures on ripe or ripening stone fruits—e.g., peaches, plums, &c. This data, I submit, should be early obtained.

Subjecting fruit to cold storage after its journey to Brisbane is of little use; as the damage, the outcome of recent fruit fly attack it may have experienced, is done during the twenty-four hours' transit. A maggot, say in a peach, can, although only just emerged from the egg in a fruit on its leaving Stanthorpe, develop into a nearly full-grown maggot by the time the fruit is opened up in the markets, everything meanwhile being in favour of its rapid development.

Persistence of Fruit Fly in Native Fruits.

On 19th June a consignment comprising the following native fruits was received from Dr. T. L. Bancroft, of Eidsvold, Queensland:—(1) *Bryonia* sp., (2) *Carissa ovata*, (3) *Solanum aviculare*.

Five fruit fly puparia (evidently that of the new species of fruit fly, bred from Bryonia by Dr. Bancroft) were found in the Bryonia fruit; the maggots had pupated during transit. In the two latter fruits, no eggs or maggots were found.

Visit of N.S.W. Entomologist and Fruit Expert.

On 16th June, Mr. W. Gurney, Government Entomologist, New South Wales, and Mr. W. J. Allen, Chief Instructor in Fruit Culture of the Department of Agriculture of that State, arrived in Stanthorpe with the object of conferring with the Entomologists, the Chief Inspector, Mr. T. W. Lowry, and Mr. J. Henderson, Instructor in Fruit Culture, on fruit fly control work, &c.

A visit was first made to the departmental cages at Mr. Barlow's, and the object of experiments involving their use explained.

Some of the fruit lying in the cage was turned over at random and several fruit fly puparia found. Both Mr. Gurney and Mr. Allen were much interested in this "over-wintering" experiment, and concurred with us in considering that it should prove a fairly conclusive test of the possibility or otherwise of the hibernation of the fruit fly as a pupa in the Stanthorpe district.

A visit was then made to Mr. A. H. Paget's orchard at the Summit, to inspect the work accomplished by the introduced and acclimatised Woolly Aphis parasite, *Aphelinus mali*.

Great numbers of parasitised Woolly Aphids were seen, clustering at the base of the trees, and also scattered among the colonies of this notorious apple-tree pest. The thorough manner in which Mr. Paget had spread this useful insect was very satisfactory, and both Mr. Gurney and Mr. Allen realised that this Chalcidid wasp, *A. mali*, should prove of great use in helping to control the Woolly Aphis of the apple here.

Fruit Fly Conference.

On 17th June a Fruit Fly Conference was held in the office of the Chief Inspector, Diseases in Plants Act, those present being Mr. W. Gurney, Government Entomologist, New South Wales, Mr. W. J. Allen, Chief Instructor in Fruit Culture, New South Wales, Mr. F. A. Perkins, Entomologist, Mr. T. W. Lowry, Chief Inspector, Mr. J. Henderson, Instructor in Fruit Culture, Mr. S. M. Watson, and myself. Every aspect of the problem was discussed on the occasion, and a general agreement arrived at on the following points:—

(1) The probability of the migration of the fruit fly (*C. tryoni*) from one district to another.

(2) The importance of native host fruits as a factor in fruit fly propagation (i.e., that of the fruit flies *C. tryoni* and *C. jarvisi*).

(3) The inefficiency of lures, as at present constituted, as a practical control of *C. tryoni* and *C. jarvisi*.

An excursion to one of the more important native scrubs in New South Wales, adjacent to the Stanthorpe district, was suggested, Mr. Gurney and the Stanthorpe Entomologists co-operating.

The visit of Mr. Gurney and Mr. Allen was greatly appreciated by all the Stanthorpe official staff, and the conference was of great mutual benefit.

On 18th July a native fruit was discovered growing about 30 miles from Stanthorpe. Specimens of this fruit were forwarded to Mr. C. T. White, Government Botanist, who reported that this fruit was the fruit of a native tree, *Capparis mitchellii*, of the family Capparidaceæ.

As this fruit is known to harbour the maggots of the fruit fly, this discovery is of some interest.

Capparis mitchellii is quite an abundant tree in the locality in which it was discovered, and the fruit of this tree is in about December full of maggots.

OTHER INJURIOUS INSECTS.

Black Peach Aphis.

The serious damage caused by this insect more or less every season and the costliness of the only really effective control-measure known here, *i.e.*, spraying with Nicotine Sulphate (Blackleaf 40), called for special investigation of other possible remedies. It is well known that the Black Aphis passes the winter months attached to the roots of the host tree. It was, therefore, considered that soil-fumigants, used

at midwinter or early spring, might prove useful in destroying the aphids present on them. Accordingly, application was made to the Entomologist in Chief, Mr. H. Tryon, for a quantity of the new soil-fumigant paradichlorobenzol. This was in due course received, and several experiments have been carried out with it; the following trees in different localities being treated. The particulars, noted by Mr. S. M. Watson, Assistant, are as under:—

Experiment No. 1.—Orchard of Mr. J. S. Mehan, Broadwater. Six trees were treated at this orchard, the trees being all of one variety, *i.e.*, Wickson Plum, and comprised one row. The quantity of paradichlorobenzol used per tree was as follows:—

—	Amount Fumigant.	Particulars.
Tree No. 1	1 oz.	Applied in shallow circular trench, 4-6 in. in depth, at a distance of 1 ft. from trunk of tree
Tree No. 2	1 oz.	Check tree. Applied in shallow circular trench, 4-6 in. in depth, at a distance of 1 ft. from trunk of tree
Tree No. 3		Check tree
Tree No. 4	1 oz.	Same as 1 and 2
Tree No. 5	2 oz.	Same as 1 and 2
Tree No. 6	2 oz.	Same as 1 and 2
Tree No. 7		Check tree
Tree No. 8		
Tree No. 9		
Tree No. 10	2 oz.	Applied in two circular trenches, 4-6 in. in depth, 1 ft. and 2 ft. from trunk of tree, 1 oz. in each trench.

Experiment No. 2.—Orchard of Mr. A. Johnson, Glen Aplin. Five trees were treated in this orchard, as under:—Tree No. 1, Lady Palmerston Peach: This tree was growing close to Mr. Johnson's house, and was isolated. Every season during the last five years this tree has been infested with Black Aphis. The amount of paradichlorobenzol used in treating this tree was 2¼ oz.

Three circular shallow trenches were made 4 to 6 inches deep around the tree, one 1 foot from the tree, one close to the trunk, and one 2 feet away from the tree, using 1¼ oz. and 1 oz. doses respectively.

Tree No. 2: Santa Rosa plum, amount used ½ oz. applied in circular shallow trench, 6 inches deep, 1 foot from tree.

Tree No. 3: Santa Rosa plum, amount used 1 oz. in two shallow circular trenches, 4 to 6 inches deep, one close to trunk of tree, and the second 1 foot from tree, ½ oz. in each trench.

Tree No. 4: Santa Rosa plum, amount used 1 oz. close to tree, and 1 oz. 2 feet from trunk, applied as above.

Tree No. 5: Isolated plum-tree (Japanese variety), amount used 2 oz., 1 oz. close to tree and 1 oz. 2 feet from trunk, in circular 4 to 6 inches trench as above.

Experiment No. 3.—Orchard of Mr. H. M. Jones, Broadwater.

Tree No. 1: Wickson plum, amount used 1 oz., applied in circular trench 4 inches deep, around and close to trunk of tree. The soil was then heaped up around the tree and pressed firmly.

Tree No. 2: Santa Rosa plum, amount used 2 oz., applied as above, close to trunk of tree as above.

Tree No. 3: Alpha plum (Peach stock), amount used 1 oz., applied in shallow trench, close to trunk of tree as above.

Tree No. 4: Mayflower peach, amount used 1 oz., as above.

Tree No. 5: Peach (Wonderful), amount used 2½ oz., applied 1½ oz. close to trunk of tree and 1 oz. 2 feet from tree, in 4 to 6 inch shallow trenches as before.

It is too early in the progress of the experiment to pronounce on the comparative efficacy, if any, resulting.

Very good results have been obtained by the use of paradichlorobenzol against the cane grub and other soil-frequenting insects, by Mr. E. Jarvis, Entomologist, who was the first to record the use of this chemical as an insecticide in Australia, and it is hoped that this soil fumigant may prove useful in helping to control similarly also the Black Aphis of the peach in this district.

San Jose Scale *(Aspidiotus perniciosus)*.

The undoubted increase of San Jose Scale during the last eight or ten years in the Stanthorpe area is a matter for earnest consideration. One neglected tree or orchard can quickly infest a surrounding clean area.

The following popular description of this scale insect, and of suggested control methods, might be of interest, as meeting the requirements of many local orchardists under their circumstances.

The Insect.—One of the most destructive orchard pests in the Stanthorpe district is the San Jose Scale. This scale insect, owing to its small size and inconspicuous appearance, is often difficult to locate, and does a considerable amount of damage before it is detected.

The female scale insects (more numerous than the males) are circular in outline and of a conical shape, not unlike a minute tent; in colour they are a greyish brown; they vary in size from 1-2 mm. (about as big as a pin's head).

Underneath this horny tent-like structure is concealed the scale insect proper, a curious unsegmented yellow legless object, possessing a hairlike sucker or beak which it inserts into the tissue of the host plant, therewith sucking up the sap.

The male scales are smaller than the female ones and more elongated.

When a tree or a branch of it becomes infested with San Jose Scale, the wood presents a roughened greyish appearance, hard to distinguish sometimes (especially when occurring on a plum or peach) from the natural bark of the tree; on closer examination, however, with a hand lens, this rough appearance will be seen to be due to the presenece of countless numbers of these minute scales which, when rubbed with the finger or a knife-blade, yield a yellow oily fluid.

Life History.—The scale insect usually passes the winter here in an immature condition, hibernating beneath its tent-like covering, a very large number of the adult female scales perishing in its course; but many of the insects (usually those about half-grown) remain, these in due course multiplying and start reinfestation in the spring. As soon as the sap in fact begins to move, the young insects (see below) become active.

The female insect under the scale virtually becomes eventually but a sack of eggs, and give rise to six-legged larval forms, as hatched within her one by one, has itself no power of movement; but as soon as the young scales are born these each crawl from under the tent-like scale, and may wander all over the tree, finally settling in one fixed position, and then inserting their beaks into the plant-tissue and cell-sap. The waxy scale soon grows and protects them. These young scales when first hatched, are just discernable to the naked eye; they are reddish-brown in colour and are active little creatures, and it is in this stage that they may be carried afield by birds and insects through having crawled on to their feet and legs.

It is possible for one female scale to give birth to about 400 young during its breeding season. Experiments were carried out by the United States Department of Agriculture to determine the progeny from one parent possible during one season. From results obtained the number was estimated at 1,608,040,200.

The rapidity with which this pernicious insect will spread will thus be easily realised, and also the need for prompt control measures on its discovery.

Damage to Host Plant.—The San Jose Scale has been found on nearly all deciduous fruit trees, such as apple, pear, plum, peach, apricot, &c. It also infests many other cultivated trees and plants, "over 100 different species being recorded as host plants of this scale."

In our own district the English Hawthorn (*Cratægus oxyacantha*) is one of the known local host plants of San Jose Scale, and doubtless there are others, such as Poplar, Elm, and Willow trees, on all of which San Jose Scale has been found in other countries.

Injury to the host tree results from the extraction of the sap by thousands of these minute insects, each of which is anchored to the branch by its hair-like sucking tube or beak. If the scale is unchecked a branch, here and there, will first die, and finally the whole tree. It is possible for San Jose Scale, if unchecked, to kill a fruit tree in two or three seasons.

On peach and plum trees the scale may be looked for on any portion of the trunk or branches; on the apple, however, it is more often on the young wood and

fruit, and sometimes on the leaves, red spots being associated in all cases with its presence there.

Distribution.—San Jose Scale may be conveyed in various ways. Birds undoubtedly carry the young active larval insects on their feet, from orchard to orchard, so also do beetles, green grasshoppers, and other tree-frequenting insects. It is possible for the young scales to be transported, too, by strong winds, and they may also attach themselves to the clothing of any person brushing against a scale-infested tree.

Natural Enemics.—As enemies of the San Jose Scale, several species of Ladybird Beetles are of prominent importance. Two, at least, of these useful beetles are actually present in this district, and wage unceasing war against the San Jose Scale. The two species referred to are Orcus Australasiæ and Orcus chalybæus; but there is yet another Ladybird Beetle here associated with San Jose Scale, *i.e.*, *Rhizobius hirtellus.*

The first two Ladybird Beetles mentioned are about one-eighth of an inch in length, and nearly as broad; both are shining steel blue in colour; and Orcus Australasiæ is varied with six orange spots on the wing cases.

The third species, *Rhizobius hirtellus*, first observed and recorded by Mr. H. Tryon in 1898 in the Stanthorpe district, is not much over one-thirty-second of an inch in length, and is greyish black in colour, marked with a reddish spot on each wing case.

The larvæ of a small tineid moth also victimises the San Jose Scale in the district; and the Entomologist named mentioned and described it as preying on the San Jose Scale in the Darling Downs area in 1898. In certain parts of this district this season these moth-larvæ did remarkable work in cleaning up San Jose Scale.

There are also several minute parasitic "wasps" (Chalcididæ, Order Hymenoptera) known to attack San Jose Scale in other countries. Doubtless, some of these minute parasites are in this district also, but we have as yet no record of it being so.

Control Measures.—Lime sulphur, is, in my opinion, one of the best sprays for San Jose Scales, the commercial lime sulphur, or the home-made lime sulphur being alike effective.

The best time to spray for San Jose Scale is during the dormant period of the tree. The spray can then be applied at its full winter strength, and a maximum killing effect on the scale secured. A simple receipe for making home-made lime sulphur is as follows:—Boil 20 lb. of unslaked lime and 15 lb. of sulphur in 20 gallons of water for about an hour. The above method produces a spray of the right strength for deciduous trees during the period mentioned.

Very good results have also been obtained in spraying for San Jose Scale in the winter again with miscible oils, such as "Gargoyle Red Spraying Oil." These should be used at a strength of about one part of the oil to twenty or thirty parts of water, and with great care when the bark is dry, especially in the case of the peach and nectarine.

Further, in using any oil spray, great care must be taken to see that the oil is properly emulsified. This can be secured by taking one gallon of oil and one gallon of water and thoroughly mixing them by aid of the spray pump until a perfect emulsion is secured, when the remaining amount of water can be added.

Diseases of Orchard Trees.

On 19th June, Inspector St. J. Pratt brought to my notice an instance of a gumming disease severely affecting plum trees in the Broadwater district. In order to obtain specimens illustrating this plant so conditioned for the Pathologist, a visit was made to several orchards in company with Inspector Pratt; many specimens were secured and forwarded to Brisbane for investigation by Mr. H. Tryon, who furnished a comprehensive report on this plant malady. Several other diseases of fungus origin also affecting deciduous fruit trees in the Stanthorpe district have been brought to his notice and specimens illustrating them been supplied.

Concluding Remarks.

Field work: Two Entomological Field Days were held during June and July, and much interesting material secured.

Entomological Contributions.

Many additions have been made to the entomological collection during the last two months by Mr. S. M. Watson (assistant), and I am indebted, too, to many of the departmental inspectors for contributions to it also; and so, too, to Mr. E. Sutton, of Broadwater, who has supplied us with many quite new and interesting insects.

TOMATO BLIGHT DISEASE (*Phytophthora infestans*).*

By HENRY TRYON, Entomologist and Vegetable Pathologist.

INTRODUCTORY.

The tomato plant when grown in Southern Queensland has many natural enemies—in the onslaught of diseases proper, and in the attacks of special insects that injure it by feeding upon its living tissues.

Amongst the latter, its insect enemies, we may mention the Cutworm (*Agrotis*), that, dwelling in the soil, may sever its stem across at its base soon after it has been planted; the Isodon Beetle that, either in its grub-stage or as an adult, gnaws away its roots; the Brown Weevil (*Desiantha*) whose green slug-like larva will consume any part of the young plant; the Lady Bird bettles (*Epilachna*) that erode its foliage; the Tomato Worm (*Chloridea*) that especially tunnels into its fruit. Then we have the small Tomato Fly (*Lonchaea*) that "blows" this when it is also still green, laying its eggs in the fissures at its base. Worse than all these, however, is the soil-frequenting nematode that causes root galls, and so makes the root-system maintain it, and to this extent rob the plants of their sustenance.

Diseases again of the tomato are both numerous and formidable. Firstly, we have various forms of wilt, that cause the plants whilst apparently in full vigour to fade away as if their roots were deprived of the moisture in the soil. There is the wilt sometimes spoken of as "sleeping sickness" due to certain bacteria living in its sap vessels—as I was the first in the world to discover; then there is the Fusarium wilt caused again by a fungus-parasite similarly inhabiting them; and further, tomato wilt of unknown origin. Then we have such fruit diseases as Glœosporium Rot, Blossom End Rot, and lastly one affecting it when it is still green—the Wet Rot. Sunscald of the fruit may also be considered in this connection. Then occur two leaf diseases—Black Spot and Grey Spot—and perhaps worst of all still to be mentioned the Tomato Blight, victimising the entire plant and occasioned by one of the so-called Downy Mildew fungi.

All these obstacles to successful tomato growing, must now however be put on one side whilst consideration is given to the last mentioned of them—"The Blight."

Tomato Blight.

General.—This malady, that is now especially to be spoken of in connection with the tomato, is one that at the outset we must refer to—and this is a very important consideration—as not being peculiar to it, since the potato plant is also subject to the malady (and to a less extent also the egg plant or Brinjal). In fact it is better known as the Potato Blight since it is in connection with it that its devastations have earned for it such world-wide notoriety.

But, after all, the same remark applies to almost the entire series of tomato insect enemies already mentioned. Thus it happens, that the tomato grower must, in his own interest, have regard to the potato plot in his own land, or growing in its neighbourhood, as a possibly prolific source whence his staple crop may at any time receive harmful visitation from both insect life and from the seeds of these infectious diseases—the one under consideration especially. In fact the very winds even that his tomato plants feel may be laden with air-borne spores that have originated in this way. Further, the plant-treatment, that in considering this matter of Tomato Blight will be later dwelt upon, has special regard to this possibility of infection from without.

How are we to recognise this particular malady? When, and where to look for it? are questions first to be dealt with.

Conditions of Occurrence.

Meteorological.—Now it must be borne in mind that the Tomato Blight as is here under consideration is a cold weather disease. In fact it apparently "works" even when the temperature is almost low enough to destroy its host plant. Thus humidity and warmth combined that we usually associate with the growth and destructiveness to plant-life of a mildew, is far from being conducive to the development of this Tomato Downy Mildew; in fact, with the advent of hot weather it practically disappears, the high temperatures of summer killing it as far as we can observe, whilst the other plant parasites may thrive then.

---

*This formed in part an address at the August meeting of the Aspley L.P. Association.

Again, although mention has just been made of humidity combined with warmth as an unfavourable condition, it must be still realised that without wet and moisture the infection of the tomato plant by blight in the first instance cannot take place. Thus it is only when water resulting from rain or mist, or such as is distilled by dew, persists on the foliage, that the parasite that occasions the malady can secure a holding, and bring about infection. These necessary weather conditions go to explain why it is that Tomato Blight is in evidence at one time of the year more than at another. Also (what is most important) we learn from this when preventive measures against its attacks are to be prosecuted with the likelihood of success.

Soil.—Those soils most productive of quick and vigorous plant-growth occupying valleys and hollows; in fact conditions in this respect most suitable for the tomato favour again blight occurrences.

The Plant.—Again, one has to consider that the disease is a very virulent and active one, and may attack the plant at any stage of its growth—in the seed bed when recently planted out, or even when much of the fruit although still green is almost ready to gather; a remark that will suggest that any preventive treatment needs, for its effectiveness, to be long continued.

Symptoms.

In the case of quite young plants, a slight development of a "yellowishness" of colour may be the first feature noticeable, but this is very soon followed by a sudden and general withering and drooping to the ground, the plants being blasted as it were. In plants of older growth, the younger shoots only may thus wilt, hang over, and shrivel up whilst still green. Now on the foliage generally and to greater or less extent, will develop indefinite palish yellow patches, usually involving the leaf-margins, but often, too, isolated from them. These are observed to gradually increase in size as meanwhile also in number, and as this happens to become of a dull brown colour denotive of death, the affected leaves too as they become wholly infected droop, shrivel up, and dry. Thus, too, the leaf-stems become involved and develop a translucent sickly hue, as they lose their consistence. Again, these brown patches may arise on the branches, especially where these originate or divide, and as these extend, and the plant-tissue here collapses, all growth beyond wilts and dies. The flower-buds and flowers again may be directly attacked. In the case of the green fruit: this early manifests a rusty brown cloud-like marking that may be of some size; but as the change beneath, that this indicates, passes outwards and inwards, not only has the "flesh" (as seen on incision) become brown, but the affected area outwardly is obscurely marked with grey and shows shallow pitting and wrinkling—the outcome of destruction that is being effected. These occurrences as they develop, as usually happens, result in death of the plant, and soft-decay of the fruit as it becomes the prey of other organisms.

It must, however, be remarked that in so much as heat is as we have seen destructive to the agent causing the disease, and leaf-wetness to its propogation, the blight may be arrested at any stage of its growth when the one weather condition arises and the other fails.

Cause.

The agent, the cause of this Tomato Blight, can scarcely be satisfactorily portrayed without illustrative figures. However, some material points may be conveyed by verbal description.

It is a fungus and one of the diminutive forms of this very comprehensive group of the lowest forms of plant life. Moreover, it is not only a parasite living at the expense of the tomato, the potato, and a few other plants, as we have seen, but an obligatory parasite—that is, one that cannot grow and reproduce itself outside its host (one of these plants named). Hence the destruction—say by fire—of the plant or any part of the plant in which it inheres reduces the extent to which it occurs. (*Note.*—This is very important when one has to consider its occurrence within the tubers of the potato, in whose tissues it can long subsist and so be transported over wide areas to originate new centres of blight occurrence). It is named for purposes of recognition *Phyto-phthora infestans*; of which the former, the generic word, merely signifies plant-supporter, or borne.

Appearance.—As to this, although a diminutive, or microscopical organism (micro-fungus), it can be seen when several individuals are massed together. Thus,

if a tomato leaf, exhibiting the earliest features of blight, be looked at from beneath, especially in the early morning, it will be observed that surrounding the yellowish blotch is a halo of greyish colour that has the appearance of the very finest powder. This is the fungus in one phase of its existence—a mass of individual forms. Let us conceive a picture of *one*, as it really is. First of all it has issued from a minute breathing-pore (stoma), one of thousands in the lower skin or epidermis of the leaf. In fact it is really rooted in the inner leaf-substance that this protects. It is in form like a little tree, with short little branchlets, ending in two-pronged forks; the points of which instead of supporting what might be taken to represent leaves, actually bear each a single oval fungus-fruit or spore, that serves the purpose of a seed.

These microscopical tree-like forms all point—hang as it were—downwards, and as the day advances and the air becomes dry, a mechanism with which the "trunk" of the tree is endowed causes it to swing around and reverse the process, and thus are the fungus-spores dropped into the air, and so come to float therein, forming motes in the sunbeam, passing to and fro, passively conveyed to wherever wind currents are proceeding.

Fortunately, these fungus-fruits or seeds (spores) are not very tenacious of life, and the majority under ordinary conditions die soon, some few—comparatively speaking—but millions amongst billions fall upon the leaves and other parts of available tomato or potato plants. Here they get imprisoned, in dew-drops, and other forms of water there occurring. Further, these fungus fruits when in this position break up usually, and give rise each to bodies smaller than themselves, that after swimming about come to rest, being in fact zoo-spores—fungus-seeds endowed with motility—one of the main features of life.

These settle down and each now gives rise to a sprout or germ-tube, that penetrating into the leaf-substance—if on a leaf the resting place occur (so also if elsewhere with little difference), ramifies therein, its branches forcing their way between the cells of the tissue of which this is composed, sending offsets or suckers into these cells and whilst thus feeding poisoning their contents—the cell sap. Then, in turn, ramifications of the parasites' growth having gained the lower-leaf surface, issue outwards in the form of those fruit-laden micro-fungus "trees"—that we have described—and so does further dissemination of the agent causing the disease ensue.

Meanwhile, the tomato leaf, stem, or fruit, as the case may be, has died and turned from green through yellow to brown—cell after cell.

Whilst realising this that has taken place, one must insist on the fact that the time occupied between the first act of infection, whether the site of this be a leaf, stem, or fruit, and the outward appearance of the fungus again—say on the underleaf surface—is always of some days duration, apparently nearly one week at least. This period, occupied with the vegetative growth of the parasitic fungus, is termed its incubation stage. Meanwhile there may be little if any evidence of its presence. Further, in some cases (for example in the case of the fruit), the vegetative stage may persist long without the fungus-spore production.

By reason of its existence of this obscure phase of life during the incubation stage, protective treatment against infection and infestation, if too long delayed—though prosecuted when there is as yet little or no manifestation of the blight—may be ineffective.

At present we have little or no evidence tending to show that any variety of tomato plant will not serve the blight fungus for the purposes of its growth and development—in other words, that it is immune from its attacks or even blight resistant.

Treatment.

Obviously, the agent occasioning the tomato plant, operating entirely within the tissues of the plant itself, the disease that it brings about cannot be overcome by any remedial agent when once it has been inaugurated. However, it has been found possible to destroy the blight fungus, both during its short transitory life when it has issued from the under-leaf surface or other part of the tomato plant, and when its "germs" have come to rest on the foliage elsewhere, and the germ tubes are being given forth by them, but have not yet penetrated and so effected the initial act of infection.

This is done by placing beforehand a germicide on the plants' entire outer surface, that, taken up by the water in which these germs occur, effect their destruction—the treatment being in this respect a preventive one against blight attack.

Bordeaux Mixture.

This spray-fluid will probably be found to be the cheapest and most efficient preventive. It can be prepared according to the direction given now in most of the works relating to horticultural practice. In this connection it may be pointed out that the present writer dwelt fully on this subject in a paper-entitled, "Natural Enemies of the Potato and How to Fight Them," pages 12-14, copies of which are available.

Burgundy Mixture.

As alluded to in this paper, it may be possible to use ordinary washing soda for the sulphate of copper; but in this case it is recommended that special care be taken to ensure that the fungicide—termed under this new form Burgundy Mixture—be not alkaline, especially seeing that the tomato is a somewhat delicate plant, and it is unknown to us to what extent it can tolerate an alkaline spray-fluid without injury through "scorching."

To ensure this being so it should be tested with phenolphthalein paper, fixed in the split of a piece of wood before being dipped therein, so as to avoid contact with the soiled fingers. The "test" may be in a liquid form, as in the case of the ferrocyanide of potash one, the phenolphthalein being dissolved in dilute alcohol, the solution being of ½ to 1 per cent. In the latter case the services of the chemist will, perhaps, be needed for its preparation. Using this test, a pink coloration will indicate alkalinity, and should it occur bluestone solution should be gradually added until it disappears. The employment of this alkaline test does not preclude the need of the use of the ferrocyanide of potash test for detecting the presence of the sulphate of copper. In fact, this should be resorted to first, and soda solution added if its requirement be indicated.

As stated in our paper for treating the potato plant for blight prevention, an arsenical salt (*e.g.*, arsenate of lead) should be added to the spray fluid when made, so that each application may not only serve this end in the case of the tomato, but its use also compass the destruction of all leaf-eating insects that have, or may invade, the plant.

With regard to the question: When is one to spray? This should be done at any stage in the growth of the plant, successive applications being made, the latter ones being with Burgundy rather than Bordeaux mixture. Further, the procedure should be repeated as long as there is any foliage, &c., that, owing to its being the outcome of recent growth or to the cleansing action of rain, is without the protective "film" of fungicide bestowed upon the plant by an earlier dressing.

It may be also remarked that the amount required for any one spraying procedure is best ascertained by first applying simple water to a few plants unless one has previous experience to guide one.

Again, that effective spraying does not imply the continuance of the application until the fungicide is running off the plant, and wetting the soil-surface beneath and around it, but on the other hand, that it should be applied in quite a mist-like form and yet in sufficient force to reach every part of the plant being treated.

Finally, it may be remarked that although the correct preparation of Bordeaux Mixture or Burgundy Mixture needs a good deal of writing to describe it, still it is a very simple process really, and one quickly mastered.

Further, that under Queensland weather-conditions—except those obtaining during the hotter months of midsummer—the attempt to grow tomatoes without resorting to the application of a fungicide as a protection to the foliage constitutes a very great risk indeed of losing the crop, through some sudden infection of the plants by the blight organism so easily brought about.

Obviously again, tomato plants that have been victimised by "blight" should be eradicated and burnt and not left either in or on the ground so as to serve a means for perpetuating the trouble on the farm or beyond its limits.

THE BEAN FLY (*Diptera-Agromyza phaseoli*).*

By HENRY TRYON, Entomologist and Vegetable Pathologist.

The damage associated with the presence of this insect, in such beans as the Canadian Wonder (*Phaseolus*), and its allies, is characterised by the development of an irregularly swollen stem, principally below the lower leaves, more or less fissured and covered with a brown scaly investment, derived from the bark proper, as the result of underlying injury and consequent changes, due to the maggots of the insect feeding beneath.

On exploring these peculiarly altered bean plant stems, say with a penknife, not only will the actual depredators be brought to light in the form of very small yellowish maggots, but the puparia of these (little oblong oval smooth bodies of much the same colour), into which these maggots have metamorphosed, and in which the insects have come to rest prior to transforming to flies.

The beans exhibiting these injuries are very much damaged indeed; in fact, the plants are practically ring-barked eventually, notwithstanding the endeavour to heal the wound, shown by the production of callus, whose substance largely contributes to their gouty appearance. Thus, at the very outset, growth is seriously checked, and soon brought to a standstill. In fact many plants attacked succumb after they have long proved unprolific.

If one of these bean plants, or even one or more of them is placed in a pickle bottle, and the mouth of this secured, small black flies soon come upon the scene, each being only but little bigger than a good pin's head. This final form of this destructive maggot is spoken of as the Bean Fly—named *Agromyza phaseoli.*

Its method of establishing injurious relationship with its host is very remarkable, and has been well described by a former Assistant Government Entomologist—Mr. E. Jarvis:—

"If we visit a bean crop on a summer's day and quietly watch the plants, it will not be long before one of the flies settles on a leaf close at hand to deposit eggs, and we shall then find it an easy matter, with the help of a small magnifying glass, to watch the interesting operation from start to finish.

"Having first raised the hinder portion of its body, the insect bends its abdomen downwards, and, with a special egg-laying instrument, called an ovipositor, punctures the surface, and skilfully inserts an egg in the thickness of the leaf under the skin or epidermis.

[NOTE.—The ovipositor in Agromyza really consists of a toothed-cutting instrument.—H.T.]

"If we pick an apparently sound leaf from a badly injured plant, and, holding it against a strong light, look through it, we shall at once notice numbers of watery-looking semi-transparent dots and minute holes distributed over the basal portion, and, upon examination of the former with a pocket lens, discover that a few of these enclose minute elongated eggs.

"A young leaf taken from a big Tonga bean on the 3rd of December, 1912, was found by the writer to have received ninety-one punctures, but only nine enclosed eggs, and his observations incline him to suggest that these empty punctures may have been made in position that would have proved unfavourable to the young larvæ, by preventing, in some way, their easy access to a big vein. He has noticed, too, that when a fly makes a puncture destined to receive an egg, she takes a little longer than ordinary over the operation, and then, moving quickly backwards, remains for nearly half a minute with her mouth to the hole, as though engaged in closing the wound or covering the egg. Such behaviour, however, does not invariably indicate the presence of an egg, as she will occasionally put her mouth to a freshly-made empty puncture, to suck the sap, perhaps, that flows freely from such injuries. Punctures made in leaves of the above-mentioned bean often become noticeable when the damaged tissue has dried and turned brown, and it is not unusual to see hundreds of such dots on the basal portion of a mature leaf. The egg stage occupies from about three to four days."

As Mr. Jarvis also informs us, on the egg hatching, the tiny maggot burrows its way through the soft tissue intervening between one face of the leaf and another into the leaf-stalk, and then proceeds in the same way down through this until it reaches the main stem, leaving in doing so only the most obscure outward indication of the course it has pursued. Having gained the stem in this remarkable manner, it joins its fellows, that may be already present therein through action of a like kind, and that are associated with it henceforth in its destructive habits.

*This formed in part an address at the August meeting of the Aspley L.P. Association.

Owing to connection between the bean fly and the bean plant being, in the first instance, brought about by eggs laid one by one in the leaves, one leaf after the other, a work in which several insects may co-operate, maggots of different ages may be present in the stem and its branches at any one time, and the injury moreover be prolonged, the plant continuously endeavouring through the activity of its cambium to repair its damage.

Moreover, the bean fly depredations are all the greater insomuch as the seedling may be attacked almost before it has produced its true leaves, and the plant ever afterwards.

Remedies.

Notwithstanding this injurious insect has an immense range of occurrence—throughout coastal New South Wales and Queensland, the East Indies and the Philippines, and west even to Madagascar—and thus efforts at overcoming it have occupied the attention of many investigators, no certain and efficacious method or methods of coping with it has been arrived at.

1. Great stress has been made on the possibility of discovering bean varieties immune from attack; experiments to this end so far, however, have only yielded negative results.

2. Again the question of utilising the services of natural enemies has been considered; but then here in Australia, as F. P. Dodd has recorded, we have several small hymenopterous insect parasites, and yet the fly's great destructiveness is experienced.

3. Farm Hygiene.—A great deal, however, can be accomplished by preventing excessive breeding of the ''pest'' by a very simple operation. Given an opportunity, brood follows brood with some intermingling in this latitude (South Queensland) almost throughout the long season in which bean plants can be profitably grown. Thus by March usually the fly has become so numerous as to defeat efforts at securing a crop. But it would seem as though the farmer had been endeavouring—such is his usual practice—to raise flies rather than beans. Allusion is made to the custom of leaving the insect-infested plants, when no question as regards their worthlessness can be raised, or when they may have even perished where they occur, to produce myriads of bean flies; instead of immediately, as soon as either condition has been brought about, eradicating them and destroying them by burning them in the field where they are. In this connection one should ascertain if any cowpeas are being grown near the bean cultivation, since although these may be used as a trap-crop, still to some extent they may serve as sources for bean fly supply.

4. Preventive Measures.—Recognising the fact that it is the special odour, attaching to the bean plant, that in the first instance attracts the fly; our experiments have been directed to masking or neutralising this by some volatile substance placed on or near the growing plants. Unfortunately, so far, no constantly effective one has been discovered. Kerosene, phenyl, and others of the kind applied mixed with sawdust to the soil wherein the plants have been used, similarly carbide waste from acetylene gas manufacture, naphthalene, &c., and still with little satisfaction. However, experiments in this direction have not exhausted every substance that appears to meet the requirements, and it may be remarked that this tentative method might include the use of fly-repellants—a single substance being endowed conceivably with this quality, as well as with the preceding ones.

5. Formerly there were some grounds for concluding that ordinary lime scattered on the soil around the ''feet'' of the plants would repel fly visitation, but it was found that such result was by no means invariably secured. It is now considered by us that any positive action on its part noted might have been brought about by the slow production of ammonia, whose liberation lime would effect from certain nitrogenous bodies already present where it was applied—a possibly suggestive fact.

6. Some little promise appears to be yielded by spraying the plants with a liquid, so as to produce a delicate film on the upper leaf-surfaces. Of these Bordeaux Mixture appears to be the best, especially when used in connection with a spreader—*e.g.*, soap solution. Of course the purpose in view is to deter the female bean fly from inserting its eggs in the leaves as is its habit of doing. The procedure is otherwise useful since it serves to deter fungus attack.

7. Earthing Up, &c.—As we have seen, the fly-injured plant is constantly endeavouring to repair the damage as it is being wrought. To aid this effort, it may be assisted in two different manners; painting stem with a form of limewash as we formerly recommended, or piling earth around this stem so as to cover it for some way up; a procedure that will, when weather conditions are favourable, cause the emission of adventitious roots to take on the work of those whose office has been rendered useless by the ringbarking, produced by the bean fly maggots, lower down towards the stem-base.

EGG-LAYING COMPETITIONS.

MOUNT GRAVATT.

During July 5,049 eggs were laid, being an average of 18·7 eggs per bird. This is an average that can be considered satisfactory and it is ½ an egg per bird better than for the same period last year. No deaths occurred and the general health has been satisfactory. The following are the individual scores to date:—

SECTION 1.

White Leghorns.

Name.	A.	B.	C.	D.	E.	F.	Total.
W. and G. W. Hindes	84	81	82	80	82	88	497
W. E. Woodward	86	86	93	70	83	62	480
John J. McLachlan	77	86	83	68	83	50	447
B. Driver	81	58	65	77	78	83	442
J. Harrington	62	66	77	85	75	77	442
Mrs. R. E. Hodge	76	71	70	91	59	73	440
Eclipse Poultry Farm	92	81	70	76	75	40	434
M. F. Marsden	72	68	64	56	76	83	419
E. J. Stilton	78	74	71	83	84	28	418
R. C. J. Turner	73	67	70	79	36	71	396
Jas. Hutton	66	65	82	43	63	70	389
S. L. Grenier	87	75	84	25	48	59	378
Jas. Earl	58	76	43	67	56	73	373
H. Fraser	33	73	79	72	66	49	372
W. Wakefield	79	83	49	65	60	35	371
L. Bird	81	70	46	46	91	26	360
N. F. Newberry	35	54	81	71	53	54	348
J. E. G. Purnell	69	37	69	78	58	35	346
E. Anderson	21	54	43	58	78	83	337
Geo. Marks	34	70	55	48	78	51	336
G. W. Cox	55	41	71	68	61	37	333
H. P. Clarke	41	74	42	54	47	73	331
A. S. Walters	64	58	42	57	27	76	324
T. H. Craig	41	70	52	50	44	62	319
Mrs. H. P. Clarke	34	71	53	52	73	34	317
Chris. A. Goos	75	24	49	65	32	65	310
Mrs. C. E. Lindley	46	30	51	73	52	55	307
T. W. Honeywill	43	1	75	56	66	46	287
W. D. Melrose	68	76	14	..	59	15	232

SECTION 2.

Black Orpingtons (except where stated).

Name.	A.	B.	C.	D.	E.	F.	Total.
Eclipse Poultry Farm	80	74	86	84	83	78	485
Jas. Potter	95	65	69	67	75	87	458
H. Cutcliffe	101	61	69	61	82	77	451
E. W. Ward	71	73	78	77	78	69	446
Geo. E. Rodgers	62	84	84	64	79	72	445
W. and G. W. Hindes	97	45	56	36	67	95	396
Mrs. A. E. Gallagher	68	67	76	38	64	81	394
Carunya Poultry Farm	73	73	27	60	79	61	373
Thos. Hindley	89	58	72	41	76	36	372
J. Pryde (R. I. Reds)	49	66	41	78	56	70	360
R. Burns	63	45	52	63	70	55	348
W. D. Melrose	10	65	73	84	73	36	341
C. Dennis	61	53	80	62	32	53	341
E. Walters	32	50	58	59	79	56	334
Jas. Hutton	54	45	80	61	18	44	302
E. C. Stead (Silver Wyandottes)	..	25	31	41	25	23	145

N.U.P.B.A. TOOWOOMBA SUB-BRANCH.

The winter test resulted as follows:—Light breds: First, No. 52, R. B. Howard, 75 eggs; second, No. 9, A. C. Horne, 70 eggs. Heavy breeds: First, No. 120, Jas. Hutton, 76 eggs; second, No. 117, T. Hindley, 71 eggs.

Special prize donated by Mr. Jas. Hutton, Kingsthorpe, for highest score for two birds, one breed, belonging to one owner, in competition, for first four months:—Winner: Mr. Jas. Hutton's Black Orpingtons—No. 120, 97; No. 119, 80. Total, 177 eggs.

Single Test Egg-Laying Competition—Scores to 30th July, 1925.

WHITE LEGHORNS.

Pen No.	Name.	Weight of Eggs.	Total for Mth.	Total to Date.	Pen No.	Name.	Weight of Eggs.	Total for Mth.	Total to Date.
42	D. H. Dipple ..	2·25	23	89	26	W. G. Harper ..	2·01	20	52
52	R. B. Howard ..	1·99	27	88	48	G. Stilton ..	2·12	13	51
40	R. C. Cole ..	2·14	20	84	45	M. J. Frawley ..	2·15	21	51
41	D. H. Dipple ..	2·05	22	83	17	W. D. Williams ..	2·10	11	51
8	H. S. Wagner ..	2·00	22	83	59	M. Murphy ..	2·30	21	48
9	A. C. Horn ..	2·19	24	81	2	Jas. Taylor ..	2·06	15	47
50	C. A. Keen ..	2·05	19	78	3	E. Parker	2·27	23	44
39	R. C. Cole ..	2·02	18	76	20	H. Dibbs ..	2·37	20	41
29	J. H. Jones ..	1·99	9	74	13	J. E. King ..	2·25	22	41
33	H. J. Manning ..	2·08	19	71	37	P. J. Fallon ..	2·35	17	40
46	M. J. Frawley ..	2·25	23	70	10	A. C. Horn ..	2·01	17	33
49	C. A. Keen ..	2·00	22	68	55	J. F. Dalheimer ..	2·27	20	31
32	J. Newport ..	2·10	17	68	25	W. G. Harper ..	2·25	19	29
21	G. E. Rogers ..	1·98	24	68	6	G. Maurer ..	2·12	14	29
43	S. R. V. Sharkey ..	2·30	15	67	12	J. Hutton ..	2·20	15	28
28	J. W. Short ..	2·03	23	67	5	G. Maurer ..	2·31	22	22
27	J. W. Short ..	2·02	23	67	53	*E. W. Howe ..	1·88	22	77
19	H. Dibbs	2·20	20	66	58	*S. Chapman ..	1·90	23	72
60	M. Murphy ..	2·12	18	66	57	*S. Chapman ..	1·88	23	69
11	Jas. Hutton ..	2·10	14	62	23	*Everlay P.F. ..	1·93	20	69
54	E. W. Howe ..	2·05	17	61	14	*J. E. King ..	1·95	15	66
38	P. J. Fallon ..	2·18	14	61	7	*H. S. Wagner ..	1·95	19	63
44	S. B. V. Sharkey ..	1·98	20	58	36	*R. C. J. Turner ..	1·90	6	34
35	R. C. J. Turner ..	2·08	20	58	16	*W. Grant ..	1·74	17	34
30	J. H. Jones ..	2·00	23	58	24	*Everlay P.F. ..	..	1	31
51	R. B. Howard ..	2·09	23	57	47	*J. Stilton ..	..	..	30
1	Jas. Taylor ..	2·32	20	56	15	*W. Grant ..	1·74	21	30
56	J. F. Dalheimer ..	2·25	20	54	18	*W. D. Williams ..	..	3	18
62	J. Goggins ..	2·04	16	53	34	*H. J. Manning ..	...	1	12
61	J. Goggins ..	2·02	16	53	31	*J. Newport ..	..	..	..
22	G. E. Rogers ..	2·07	16	53					

BLACK ORPINGTONS.

Pen No.	Name.	Weight of Eggs.	Total for Mth.	Total to Date.	Pen No.	Name.	Weight of Eggs.	Total for Mth.	Total to Date.
120	J. Hutton ..	2·28	27	97	98	V. J. Rye	2·20	16	67
117	T. Hingley ..	2·00	24	91	111	E. Walters ..	2·07	21	65
89	A. W. Le Pla ..	2·10	24	91	114	D. W. Williams ..	2·02	20	63
128	J. W. Short ..	2·10	23	90	108	C. Graham ..	2·17	12	63
103	L. Maund ..	2·20	24	89	112	E. Walters ..	2·30	21	61
121	E. W. Brock ..	2·15	22	83	102	T. J. Carr ..	2·15	15	59
107	C. Graham ..	2·00	25	81	96	R. Burns	2·04	26	59
99	A. R. Petty ..	2·15	17	81	85	— Kelly	2·35	23	58
132	G. E. Rogers ..	2·37	25	80	118	T. Hindley ..	2·06	27	57
119	J. Hutton ..	2·42	23	80	90	A. W. Le Pla ..	2·27	24	57
131	G. E. Rogers ..	2·33	25	78	126	H. B. Stephens ..	2·11	26	56
103	L. Maund ..	2·06	11	75	88	J. Head	2·03	22	56
97	V. G. Rye ..	2·30	23	75	109	S. McBean ..	2·13	21	55
100	A. R. Petty ..	2·30	16	70	123	P. Hopkins ..	2·06	25	54
95	R. Burns ..	2·24	22	69	113	D. W. Williams ..	2·25	12	47

* Signifies bird laying under-weight eggs.

N.U.P.B.A. TOOWOOMBA SUB-BRANCH—*continued.*

BLACK ORPINGTONS—*continued.*

Pen No.	Name.	Weight of Eggs.	Total for Mth.	Total to Date.	Pen No.	Name.	Weight of Eggs.	Total for Mth.	Total to Date.
86	— Kelly	2·12	20	45	130	*R. Neil	1·81	23	100
84	W. R. Wilson ..	2·08	26	43	116	*Everlay P.F. ..	1·87	21	85
122	E. W. Brock ..	2·18	19	37	127	*J. W. Short ..	1·92	24	79
125	H. B. Stephens ..	2·27	7	36	124	*P. Hopkins ..	1·91	19	64
103	W. S. Adams ..	2·05	12	35	129	*R. Neil ..	1·61	9	48
115	Everlay P. F. ..	2·16	17	32	91	*K. Macfarlane ..	1·86	13	42
92	K. McFarlane ..	2·27	13	32	94	*T. C. Ollier ..	1·96	19	33
83	W. R. Wilson ..	2·05	21	31	101	*T. J. Carr ..	1·95	19	30
87	J. Head	2·02	14	26	103	*T. C. Ollier ..	1·95	25	27
110	S. McBean ..	1·98	21	22	104	*W. S. Adams ..	1·86	13	26

OTHER VARIETIES.

Pen No.	Name	Variety.	Weight of Eggs.	Total for Month.	Total to Date.
71	H. Dibbs	Langshan	2·12	21	79
64	S. Chapman	Brown Leghorn	2·00	20	63
75	— Badcock	Rhode Island Red ..	2·14	19	61
73	A. W. Le Pla	Rhode Island Red ..	2·15	19	55
65	Mrs. K. O'Connor ..	Brown Leghorn	2·17	20	43
69	— Badcock	Langshan	2·16	23	38
74	A. W. Le Pla	Rhode Island Red ..	2·22	18	32
72	— Dibbs	Langshan	2·18	20	30
68	E. Parker	Brown Leghorn	2·12	20	26
70	— Badcock	Langshan	2·23	21	21
81	V. Brand	Black Langshan ..	2·05	15	19
67	E. Parker	Black Langshan ..	2·15	6	17
80	*Everlay P.F.	White Wyandotte ..	1·80	27	66
77	*L. Maund	Coloured Wyandotte ..	1·88	14	62
79	*Everlay P.F.	White Wyandotte ..	1·95	22	56
82	*V. Brand	Brown Leghorn ..	1·85	24	54
63	*S. Chapman	Brown Leghorn ..	1·93	22	51
66	*Mrs. K. O'Connor ..	Brown Leghorn ..	1·90	21	47
78	*L. Maund	Coloured Wyandotte ..	1·70	12	40
76	* — Badcock	Rhode Island Red ..	1·90	17	32

* Signifies bird laying under-weight eggs.

J. GARNER, Government Supervisor.

CLOTTED CREAM.

By L. VERNEY, Dairy Inspector.

The manufacture of this luxury was originally confined to the counties of Devon and Cornwall, but it is now successfully carried on in practically all countries where dairying is done. It is now largely recommended by the medical profession as an excellent fatty food, and is often ordered in place of cod liver oil for invalids. Clotted cream is exceptionally rich in fat. It often contains as high as 60 per cent. The fat of clotted cream is more digestible than any other kind, as it is in a finely emulsified condition. The milk required for use must be rich. The evening's milk is better for the purpose than that of the morning.

Method of Preparation.

The method of preparation is as follows:—

Immediately the milk is drawn from the cow it should be properly strained into setting pans, the pans most suitable being glazed crockery ones, holding about 8 quarts. If these are not procurable ordinary well-tinned pans will suffice.

These measure about 16 inches across the top and are about 6 inches deep and 12 to 14 inches at the bottom.

The milk is left in the pan or pans undisturbed for about eight hours in the summer and during the winter months it is advisable to allow them to stand for twelve to fourteen hours.

After standing for the times mentioned above the pans should be removed to the stove. Great care should be taken not to shake them, as this has a tendency to disturb the cream on the surface. The milk should be heated to a temperature of 180 degrees Fahr. and the slower the better. It should not be hastened, as the characteristic scald flavour is wanting and the cream may be rendered greasy. After the milk has attained the temperature of 180 degrees it should be removed from the stove and placed in a cool room with a current of air playing on the pans.

When the contents of the pans are cold the cream may be taken off with a perforated cream skimmer in a thick clotted condition and it is ready for use.

In England the cream treated as mentioned above finds a ready sale, and when once tried it generally means further inquiries.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JULY, 1925 AND 1924, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of Years' Records.	July, 1925.	July, 1924.
North Coast.	In.		In.	In.
Atherton	0·97	24	0·17	1·62
Cairns	1·63	43	0·55	2·75
Cardwell	1·45	53	...	0·20
Cooktown	1 02	49	0 46	3·37
Herberton	0·75	38	0·26	1·19
Ingham	1·58	33	0 32	0 50
Innisfail	4·80	44	0·98	8·89
Mossman	1 61	17	0 35	1·98
Townsville	0 58	54	0·11	...
Central Coast.				
Ayr	0·68	38	0·15	0·01
Bowen	0·95	54	0·[illegible]3	0 14
Charters Towers ...	0·64	43	0·23	...
Mackay	1·73	54	0·39	0·47
Proserpine	1·43	21	0·42	0 72
St. Lawrence ...	1 33	54	...	2·08
South Coast.				
Biggenden	1·48	26	0·87	4·58
Bundaberg	1 96	42	0·45	3·63
Brisbane	2·33	74	0 72	5·33
Childers	1 84	30	0·13	6·64
Crohamhurst ...	2 94	30	0·50	9 17
Esk	2·08	38	1·07	4·96
Gayndah	1 54	54	0·41	2·42
Gympie	2·26	55	0·58	5·64
Caboolture	2·36	38	0·43	6 90
Kilkivan	1·73	46	0·81	2·63
Maryborough ...	1·98	53	0·34	4·69
South Coast—continued:	In.		In.	In.
Nambour	3·06	29	0 23	9·97
Nanango	1·79	43	0·57	2·87
Rockhampton ...	1·53	38	0·18	2·02
Woodford ...	2·59	38	0·25	4·89
Darling Downs.				
Dalby	1·80	55	1·13	1·65
Emu Vale ...	1·62	29	0·93	2·13
Jimbour	1 66	37	1·30	1·34
Miles	1·75	40	0·63	2·06
Stanthorpe ...	2·09	52	1 92	2·75
Toowoomba ...	2·12	53	0·84	4·83
Warwick	1·87	60	1 09	3·45
Maranoa.				
Roma	1·53	51	0·56	2·92
State Farms, &c.				
Bungeworgorai ...	1·74	11	0·55	3·44
Gatton College ...	1·48	26	0·59	2 62
Gindie	1·06	26	0·52	0·33
Hermitage ...	1·86	19	0·86	2·85
Kairi	1 27	10	...	1·80
Sugar Experiment Station, Mackay	1·54	28	0 42	1·55
Warren	1·36	11	0·18	1·59

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for July this year, and for the same period of 1924, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Meteorologist.

TUBERCULIN TESTING OF SWINE.

By W. J. PENFOLD, M.B., Ch.M., B.Hy., Director, Commonwealth Serum Laboratories.

Tuberculous infection of pigs is observed almost solely in countries where these animals are fed with refuse from dairies, the proportion of cases being much lower where they are fed entirely on vegetable tubers, cooked grains, or pasteurised whey. Freqeuntly the glands of the neck are first involved, probably a result of infection by digging with the snout into infected cattle manure. P. de la Cruz Mendoza (1) reports that diagnosis of tuberculosis post mortem in swine requires a very minute examination. This may be due to the short life of the animal, the infection being chiefly glandular and abdominal. Localised forms of tuberculosis are reported as well as the generalised form, the latter sometimes being acute.

Swine are susceptible to the three types of tuberculosis—human, bovine, and avian—the majority probably being bovine, as indicated by the investigations of the English Royal Commission, and by Eastwood and Griffith (2).

For the diagnosis of tuberculosis in swine, either the ophthalmic or the intradermic method is recommended.

Schroeder and Mohler (3) drew attention to the fact that a thermic test in pigs is rather unreliable owing to the fluctations of temperature which may be due to the comparatively small size of the lungs. If it is desired to use the subcutaneous method of testing, each animal should be separately confined in a quiet place for twelve hours before taking the temperature, and before the injection of tuberculin. The dose to be used for this test in swine varies from 0.1 c.c. to 0.3 c.c. of raw tuberculin, according to the age of the animal (Calmette) (4).

In making the ophthalmic test, which is the best for general use in swine, Koch's Old Tuberculin, containing no carbolic acid, is used—about 0.2 c.c. is allowed to drop from the phial into the eye chosen for the test. The untreated eye is used as a control. As a rule, the characteristic manifestation of the reaction for tuberculosis following the ophthalmic test commences in three to six hours and lasts twenty-four to forty-four hours or even longer. This manifestation consists of a typical purulent discharge from the conjunctival sac, frequently associated with swelling, reddening, and gluing of the eyelids. The tested animals should be examined in a good light at frequent intervals from the third hour. A purulent secretion from the tested eye is an indication of a positive reaction. At times only a very small quantity of pus may be present, while at other times the reaction may result in true pyorrhœa. The reaction is indicated in varying degrees in different animals, but the intensity of reaction bears no relation to the extent of the disease in the reacting animal. If there is any doubt as to whether the reaction is positive, a second test can be carried out in the same eye seventy hours later.

The reaction disappears in several days, leaving no trace.

The intradermic test is done on the ear, about 0.1 c.c. of Koch's Old Tuberculin being inoculated into the dermis of the antero-lateral portion of the ear. The skin is pinched up and the needle introduced almost parallel to the surface, care being taken that the bevelled side be turned outward, and consequently toward the epidermis, not toward the hypodermis when the needle is in position (Mantoux) (5).

When the reaction is positive, it is already visible within a few hours—the maximum being reached at about forty-eight hours.

There is a central nodular infiltration, pink or bright red, surrounded by a halo of pink erythema. The central infiltration may vary in diameter from one to several centimetres. The skin is hot and sensitive and gives a sensation of thickening of the dermis. The reaction as a general rule begins to recede after forty-eight hours, though a pigmented trace may remain for several weeks.

When the reaction is negative, the slight needle traumatism is practically invisible after forty-eight hours.

The intradermic test may be done in conjunction with the ophthalmic test.

Tuberculins for each of these tests may be obtained from the Commonwealth Serum Laboratories. Every batch of these products is fully tested for potency.

REFERENCES.

(1) Boletin de Agriculture y Ganaderia, Jan., 1906.
(2) Report to the Local Government Board No. 91, 1914.
(3) Report of the U.S. Dept. of Agric., Washington, 1906.
(4) Tubercle Bacillus Infection and Tuberculosis in Man and Animals (Calmette).
(5) Compt. Rendus Acad. des Sciences 1908, pp. 147, 665. Compt. Rendus Soc. de Biologie 1909, pp. 67, 54, 436, 665.

PIG CLUBS.

THEIR VALUE IN QUEENSLAND AGRICULTURE.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Much of the information contained in these notes has already appeared in the Journal, and the whole will be incorporated in an illustrated pamphlet, "Pig Clubs for Queensland Scholars," which will be available for issue shortly, free of cost to those interested. Application for copies of this and other extracts from the Journal should be made to the Under Secretary, Department of Agriculture and Stock, Brisbane.—Ed.

Considerable interest has been evidenced in connection with the initiation of Pig Clubs in a number of State schools in the Maroochy district, on the North Coast line of this State, as well as at the Nambour Rural school, and at State and Rural schools in the Fassifern and Brisbane Valley districts, and as some very definite objectives have been gained the time is opportune to take a general survey of this very important aspect of agricultural education.

In the United States of America, in Canada, in Great Britain, and in other countries, some thousands of extremely practical and profitable Pig Clubs are in operation, and a deep and wide-spreading interest has been displayed among the younger generation of farmers in the development of this branch of the Home Project Scheme.

It has been shown that in the countries named the boys and girls are being trained and are actively engaging in the most modern phase of pig raising, a training that has proved of the greatest value to these youthful farmers and to the pig industry in the countries in which they reside and operate.

Experience in Queensland also has already shown that interest is being stimulated, and that where Pig Clubs have been in operation the conditions under which pigs are kept are being very considerably improved, a result in itself that most assuredly justifies the nominal expenditure involved in taking up these schemes. In the United States, Pig Clubs will be found in operation in almost every county and small centre in Kansas, Iowa, Missouri, and other hog raising centres. These include clubs for both pork and bacon pigs, for breeding sows, and for sow and litter, and in numerous instances club members have competed successfully in the "Ton Litter" scheme of which the American pig farmer is so proud.

An endeavour is being made in Queensland to develop clubs along similar lines to those that have proved so successful abroad, and, though at present the scheme is in its infancy, there are immense possibilities with ample opportunities for future extension work.

Pig Club Leaders.

It will be necessary in the development of the Pig Club project here that Pig Club leaders be appointed to control this work and to co-operate with the State Instructor in Pig Raising and the head teachers of Rural and State schools in initiating clubs in the various agricultural and dairying centres throughout the North.

In America, for instance, the work is supervised by the Boys and Girls' Pig Club Department through a State Club leader, who is employed co-operatively by the United States Department of Agriculture and the State Agricultural Colleges; these officials plan details of the work, and put them into operation through assistant State leaders or specialists in club work, who have direct charge of the live stock club work promoted by the colleges. In many centres the detailed work is carried on locally by the County Farm Bureau (an organisation similar to our Local Producers' Associations) as a definite and very important part of its programme. In centres where Pig

Plate 60.—Group of Pig Club Members, Nambour Rural School, and Head Teachers of District Schools.

Back Row (Left to Right): E. J. Shelton, Instructor in Pig Raising. Messrs. Slater (Yandina), Steele (Nambour Rural), Watt (Mapleton), Frawley (Palmwoods); Name not available.

Clubs are to be introduced for the first time, the county agent (known as district agents here formerly, and now as district secretaries and organisers) secures a local leader who helps to enrol the members and to organise the clubs, while in communities where the Farm Bureau has not yet been organised other agencies are made use of, such, for instance, as county superintendents, Chambers of Commerce and Agricultural instructors. Most of the work, however, is in organised centres having a Farm Bureau or similar association. The local leaders' duty is to encourage boys and girls and to help in an advisory capacity in giving instructions *re* feeding, preparing for shows, and in record keeping. Arrangements are also made for members to meet once a month at least to give attention to club matters, and at these gatherings, which are conducted on social lines, business problems are discussed and suggestions brought forward; thus the meetings are interesting and helpful, and are a pleasure and stimulant to both members and staff. As a progressive step, club tours, picnics, camps, &c., are arranged, and in general the whole scheme is approached as worthy of the utmost consideration and attention. The club motto is especially applicable to our conditions here, viz., "To make the best better."

Enthusiasm, loyalty, and service are the three outstanding features in the organisation. Up to the present, however, matters have not progressed to this stage in Queensland, though on numerous occasions lantern lectures on various aspects of pig raising have been a feature of the work, and in the Mapleton district particularly several round district tours were arranged, when an official inspection of the various animals competing in the competition formed part of the outing. On these occasions both club members, the head teacher of the State school, and the Instructor in Pig Raising were present, as is shown in Plate 60. These homely visits were much appreciated, and were a source of inspiration to the children. They were equally interesting and encouraging to the club leaders, and were the means of encouraging the different competitors to try and do better than their neighbours in preparing their exhibits for exhibition.

Additional Features.

In all club work two principal objectives are being steadily kept in the forefront. First, it is the intention to demonstrate per means of these competitions that there is "Profit in Pigs"; and secondly, that the industry is an interesting and remunerative one well worthy of recognition and of taking up on sound commercial lines. The educational feature is also constantly stressed so that members may the more fully realise that their work in the club means more than the making of money and winning of prizes; for it is important that they should be given opportunities to co-operate in community enterprises and programmes of work which are always best carried out on truly co-operative lines.

Through Pig Clubs the American boys and girls have been taught to look upon the community and its problems not from the mere selfish point of view, but with a spirit that makes for general improvement. The spirit of service and citizenship thus engendered is one that the younger generation can apply all through their lives.

From the industry standpoint it is hoped members here will realise more fully the necessity of proper care and attention and of improved methods of feeding and housing. Records of the kinds and amounts of food used and the cost or value of same, together with details as to the time spent on the work, are to be kept by club members, and in due course these are to be formulated and presented for the inspection of all concerned in the organisation of the clubs. From a perusal of the essays appended to this article it will be found that quite a number of these features have become impressed upon the young members' minds.

The Extent of the Work.

To show the extent of the work overseas and indirectly the possibilities here, it is interesting to note that during 1923 and 1924 boys and girls' Pig Clubs owned or managed approximately 1,800 pigs at a profit to themselves of nearly 30,000 dollars—this in Kansas (U.S.A.) alone with 107 clubs and 980 members. A special feature of the work there is that the members are taught and encouraged to fit their animals

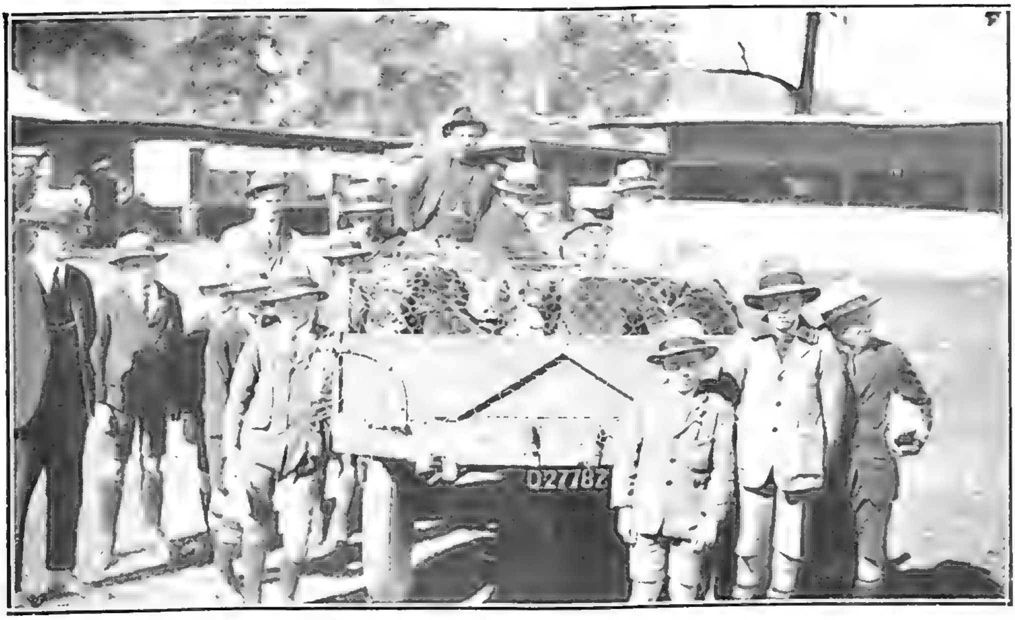


Plate 61.

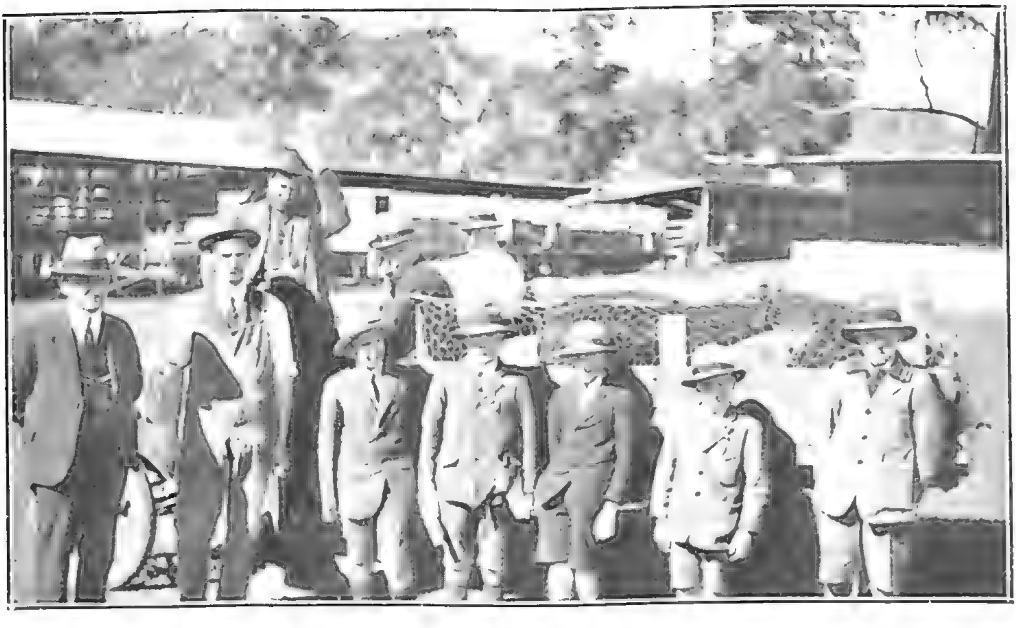


Plate 62.

The Transport of Pigs to the Nambour Show aroused the interest of Pig Club Members. Consignments by motor lorry from Mapleton, Blackall Range.

for the show ring, with the result that large numbers of Club Pigs have been shown at local, county, and State fairs, and generous prizes have been won, many times in competition with adult breeders. Club members conduct many valuable demonstrations in this way, and this has stimulated others to better things. Some of the phases demonstrated (and it is along these lines that we in Queensland are working) include the value of balancing the ration, the importance of pasture and forage crops for pigs, costs of pork production, use of self-feeders, care of the brood sow—especially prior to and at farrowing time—care of the litter from birth onwards, proper selection and judging of animals, disease prevention, treatment, and control.

One striking example of this latter phase is in inaugurating new methods in the prevention of worm infestation in young pigs. In this connection it is on record that the United States Department of Agriculture worked out one efficient system by which worm infestation could be prevented, but farmers have been slow to put it into practice or to realise its advantage. For this reason club members in about twelve counties in Kansas were selected to take up demonstration work on these lines. The work was carefully supervised and records kept, and in due course a complete treatise is to be issued showing the nature of the experiments, results, &c. Other demonstrations are conducted in a similar manner. There is a wide field for work in this direction in Queensland, for though in general the health of the pigs in this State compares more than favourably with that of pigs in other States and countries, there is ample scope for reducing the losses and for stamping out the many diseases to which pigs are subject here.

Young Judges' Competitions.

Extended reference was made in the August (1925) issue of the "Queensland Agricultural Journal" to this phase of live stock work. It is a branch of the business to which the attention of Pig Club members is being directed, for we need to train judges to adjudicate at our various agricultural, horticultural, and pastoral shows. It is hoped during the coming year to inaugurate young judges' competitions in connection with Queensland Pig Clubs in the expectation that the winners may be induced to compete at the Royal National Exhibition 1926, at which quite a list of valuable prizes will be offered, not only for pig judging but for other classes of live stock also. Owing to local difficulties of transport, &c., it is hardly possible here to arrange country show stock judging tours and contests as are a special feature in American agriculture, but we should be able to enter teams from various districts at the Royal National Shows.

The Pure Bred Scheme.

A feature of Pig Club work is to encourage the use of pure bred breeding stock on farms generally throughout the State. The stock which are to be introduced and used in these clubs will, it is hoped, be retained as the foundation of many new herds; in some instances the stock will be retained on their own farms by club members and their people, in other instances the animals will be disposed of to neighbouring farmers either by auction or private contract. In this way the whole industry should benefit, though this is necessarily a slow process in an immense State like Queensland. Nevertheless, the State is, after all, only a collection of communities so that as in other parts of the world we are starting at a logical place in the improvement of the herds.

The Pig Club competition at the Nambour Show in July created very considerable interest, not only among club members and officials, but among visitors to the show from various parts of the State, while locally the interest created in the different centres was quite a feature.

Rules of Membership.

Membership in Pig Clubs is not necessarily confined to any particular class of boys or girls. If required, the membership may be arranged into classes.

(*a*) For school pupils up to the age of fourteen.

(*b*) For pupils whether still attending school or over the age of fourteen.

PLATE 63.—SCHOOL PIG CLUB COMPETITIONS.
Boys keenly interested in penned porkers at the Nambour Show.

PLATE 64.—HOUSING PIGS ON THE SHOW GROUND IS ANOTHER PHASE OF PIG CLUB WORK.
The Nambour Show Officials were not wanting in providing necessary conveniences. Boy exhibitors are interested in the comfort of their animals in their Show quarters.

The rules require that each contestant raises his or her own pig to not more than six months old in the case of bacon pigs, or as arranged in porker classes or classes for stud sow with litter or stud boar, in each case the member must feed and attend to the animal and be entirely responsible for its management and exhibition; this usually requires that the pig be housed and fed apart from any other pigs on the farm unless the member is actually caring for all the pigs kept. Each contestant is required to keep a record on forms to be provided (a notebook may also be kept as an aid to writing the essay) containing any points of interest such as the animal's name and breeding, its purchase price and details of purchase, date pig was purchased or entered the contest, its actual live weight at time club commenced operations; the nature and quantity of feed used, notes *re* bedding, cleanliness of sty and of animal; the number of days fed, the name, quantity and value of food grown, including crops such as pumpkins, sorghums, maize, lucerne, sweet potatoes, waste fruit, &c.; the animal's weight at end of contest, gain in weight per week or month, market value at current rate per pound when ready for market, profit gained as a result of the transaction; notes *re* the health and well being of the club pig and of other pigs on the farm, class of sty, its size, situation, aspect, approximate size of grazing area, and any other information available.

Where convenient the pigs are to be exhibited at the local or district show, where arrangements will be made for the housing of animals, for judging, &c. If at all possible, contestants are to attend the show and care for their animals there also.

The following scale of points has been drawn up for use in club work, and, if at all possible, will be strictly adhered to in every club initiated.

PIG CLUB AWARD CARD.

Points will be awarded as follows:—

	Possible Points.	Points Awarded.
1. Type and quality of animal selected	15	
2. Rate of increase in weight of animal	10	
3. Cost of production; the use of home-grown foods being an important consideration	15	
4. Sanitation, condition of pig sty and grazing area ..	10	
5. Health of animal, freedom from parasites (lice, &c.)	5	
6. Interest shown in management of the animal by the club member	10	
7. Arrangements for marketing, exhibiting at Show, &c.	5	
8. Essay in "How I selected, fed, managed, and Exhibited my Pig"	10	
9. Market value of animal. Actual live and actual dressed weight and value per pound to be taken into consideration	10	
10. Order of Merit in Prize List at Show	10	
Possible	100	
Total Points Awarded.		

When Pig Club members have competed in the first instance with a young sow pig, arrangements may be made at the end of the competition for this sow to be entered in a sow and litter club, this competition to be continued into the following year, but this is only possible where sufficient inducement offers and up to the present has not been adopted; this contest it will be found requires much more skill, care, and attention than that required in fattening a pig for market, important and all as is this latter feature of the work.

PIG CLUB COMPETITIONS IN THE MAROOCHY DISTRICT, JULY, 1925.

Following is a list of the members and of the Awards in the School Pig Club Competition at Nambour Show, July, 1925:—

Class.	Name of Club Member and School.	Prize Awarded.	Live Weight of Pig as Recorded over the Scales.	Dressed Weight Estimated at 30 per cent. less than Actual Live Weight.
			Lb.	Lb.
Heavy Baconers, 126 lb. and over	Fred Bruhn Mapleton ..	1st Prize	180	126
	Robert Williams, Mapleton	2nd „	182	127
Prime Baconers, approximately 106 lb. to 120 lb. dressed	John Tanner, Mapleton ..	1st „	167	116
	Samuel Sellick, Yandina ..	2nd „	167	116
	Douglas Wells, Kureelpa ..	3rd „	160	112
Light Baconers, approximately 86 lb. to 105 lb. dressed	Arthur Kuch, Mapleton ..	1st „	148	103
	James Cramb, Mapleton ..	2nd „	120	84
Heavy Porkers, approximately 75 lb. to 85 lb. dressed	Kenneth Senescall, Mapleton	1st „	117	81
	Dave M Grath, Nambour ..	2nd „	108	75
	Clifford Richardson, Perwillowen	3rd „	105	73
	Joyce Best, North Arm ..	4th „	107	74
Prime Porkers, approximately 56 lb. to 70 lb. dressed	Eddie De Vere, Mapleton ..	1st „	94	65
	Ronald Watt, Mapleton ..	2nd „	82	57
	Vincent O'Brien, North Arm	3rd „	92	64
	John Harding, Flaxton ..	4th „	97	67
Light Porkers, approximately 40 lb. to 55 lb. dressed	Harold Alford, Traveston ..	1st „	72	50
	John Alford, Traveston ..	2nd „	67	46
	Errol Gibbons, Forest Glen	3rd „	78	54
	Alex. Howe, Woombye ..	4th „	64	44

Prize for Champion Bacon Pig of Show was awarded to Fred. Bruhn, of Mapleton, for his Tamworth-Berkshire cross barrow pig.

NORTH COAST PIG CLUB COMPETITION AT NAMBOUR SHOW, 1925.

Prizes awarded for Pig Club Essay on "How I Selected, Fed, managed, and Exhibited my Pig."

Name.	Points Awarded.	Name.	Points Awarded.
Ronald Watt, Mapleton	10*	Dave McGrath, Nambour	8
James Cramb, Mapleton	10*	Joyce Best, North Arm	8
Eddie De Vere, Mapleton	9½†	Errol Gibbens, Forest Glen ..	7
Douglas Wells, Kureelpa	9½†	Vincent O'Brien, North Arm ..	7
Arthur Kuch, Mapleton	9‡	Samuel Seliick, Yandina	7
Alex. Howe, Woombye	9‡	John A. Tanner, Mapleton ..	6
Fred. Bruhn, Mapleton	8	Kenneth Senescall, Mapleton ..	6
Robert Williams, Mapleton ..	8	Jack Alford, Traveston	6
John Harding, Flaxton	8	Harold Alford, Traveston	6
Clifford Richardson, Perwillowen..	8		

*Divide First Prize of 10s. †Divide Second Prize of 8s. ‡Divide Third Prize of 6s.

PRIZE WINNING ESSAYS.

Appended are copies of the prize winning essays. Copies of any of the other essays submitted may be obtained on application to the Department of Agriculture and Stock, Brisbane, but they will be included with this article when it appears in pamphlet form.

HOW I RAISED MY PIG.

By RONALD WATT, Mapleton (age 12 years).

I obtained a pig from a local piggery in March, 1925, with the object of preparing it for the pig competition, but it soon developed the "staggers," and I tried to find out a remedy. Luckily just about this time Mr. Shelton visited our school, and after having a good look at my pig he promised to try and get another pig for me. The second pig arrived on 8th June, and was at that time about six weeks old and weighed 25 lb. The pig was a Tamworth-Berkshire cross.

To keep my pig away from the other one we had I had to build a new sty. I got some waste timber from the mill and made a small sty and put down a wooden floor. Then I got some wire netting and built a small run for my pig. To start with, the run was covered with thick paspalum grass, but it was not very long till the pig ate up all the grass. I covered part of the sty with a roof of bark and iron, so as to make sure that my pig would have a dry sleeping place, and I gave him plenty of dry grass to sleep on. When the cold westerly winds were blowing he could stay in his shelter and keep warm. We had some very wet weather, and he liked to come out to his run and scamper round in the rain. He soon made a hole in the corner of his run, and got muddy and dirty. When the weather cleared I washed him and made him nice and clean once more, and filled up the hole he had made. It was not long before I found out that my pig liked to be scratched and rubbed. He became very quiet, and when I rubbed him with a stick he would lie down on his side and stay there as long as I would scratch him. My pig has a very good appetite, and will eat up all the scraps from the kitchen—the only thing he will leave out of a tin of scraps is the orange peel. We have a cow at home, and the pig gets all the skim milk, and he likes it very much indeed. I have some cow cane and a small plot of sugar-cane growing, and I give him cane and banana stems after putting them through the chaff-cutter. He is very fond of potatoes, and I have been able to give him quite a lot from a little plot I have. I give him a regular supply of charcoal and a little lime water now and then. Also, sometimes a dose of salts. He likes grass and thistles, also chick weeds. I have some kikuyu grass growing, and he likes that, too. I had some cobs of corn saved up, and he has eaten them all.

Several times I have given him a good rubbing with oil, and it keeps his skin nice and clean. When the weather is dry it is easy to keep him clean, but when it rains he likes to run in the wet and get muddy.

When I came to get my pig ready for the show I gave him another good bath, with plenty of soap and warm water, and rubbed him with a scrubbing brush. He kept still, and I had no trouble with him. Then I rubbed him dry, and gave him a good rub with oil, and cut the coarse hairs out of his ears, and he looked so nice and clean that I did not feel like parting with him. He is to go to the show in a motor-truck on Wednesday, 29th July. Mr. Shelton visited our school twice while we were raising our pigs and gave us lots of good advice about raising pigs.

He visited all the homes of the boys of the Pig Club and looked at the pigs. I was lucky enough to be with him one afternoon at the slaughter-yard when he examined a pig which had the "staggers." The pig was killed, and he cut it open and looked at its kidneys, liver, heart, brain, stomach, and intestines. He said he thought the feeding had a good deal to do with the trouble, as the stomach contained a lot of fibrous material which should have been got rid of. Mr. Shelton gave us two lantern lectures, and showed us some very nice slides. He also gave us some printed papers which had a lot of useful information about pigs. My pig is to be sold at the show, and I want to get another little pig and rear that to be ready for Christmas.

HOW I SELECTED, MANAGED, FED, AND EXHIBITED MY PIG.

By JAMES CRAMB, Mapleton School (age 12 years).

Selection.—When I decided to get a pig I thought it would pay best to get a good one. But as I did not know enough about the merits of any particular breed, I decided it would be good policy to get one from the most successful dairyman. So Freddy Hill accompanied me around the dairy farms of the district. And as he is a better judge of pigs, I knew I could not go wrong in letting him be spokesman. We visited the piggeries of the following gentlemen:—Messrs. W. E. Pope, J. C. Dixon, A. J. Hooper, McMahon, W. Whitecross, W. Johnson, Kuch, Herron, Geirin, and Mrs. Ekin. Most of these people required all their pigs for their own purposes, or had already sold all of suitable age. One or two had older pigs which were too big and expensive for our pocket. Fred said it would not be good business to pay more than 30s. for any pig, no matter how big it was. One gentleman had only one pig left, for which he wanted 20s. This price served all right, but Fred said it was the little one of the family, and his dad said there was nearly always one little one in every pig family, and it would never do as well. We finally got a nice little black and white pig from Mr. McCann, of Dulong, for 20s. This pig was only four weeks old when we got it on 17th March, so it would be born about the 17th February. We guessed it would weigh about 10 or 12 lb. when we got it. The only fault we could find with this pig was that it was a bit young.

Management.—Before we set out to select a pig we first built a pigsty on a site with a good slope for drainage. Fred and I built the sty of posts we got from the bush and some waste sawn timber we got from the sawmill and some timber that Dad gave us. We put a wooden floor over most of the sty, leaving the lowest corner without a floor for sanitary reasons, and putting a roof over the top corner with a little room partitioned off for him to sleep in; we made his bed of straw and sometimes cane trash, changing it about once a week.

Mr. Shelton visited the school twice, and on each occasion inspected the pigs of the club members, and also gave a lantern lecture at night on pig raising, which was very interesting and instructive. After his first visit we built a small run for our pig 20 feet by 15 feet. We also groomed him well with a dandy brush, and oiled him with cocoanut oil several times. He is not a dirty pig, but we have washed him twice with clean warm, soapy water to make him look nice for the show. If pigs are properly cared for they are very cleanly in their habits.

Feeding.—The pig being young, we fed it well with fresh milk for the first two or three weeks; after that we changed its diet to skim milk and kitchen scraps, potato peeling, &c. He was a particular little chap about his food, and would not take kindly to everything we offered him, often picking out the dainty pieces and leaving anything in the line of raw vegetables, but as he grew older he became less faddy about these things, and relished raw vegetables, green weeds, and a bit of soft sugar-cane occasionally. We also gave him charcoal, as advised by Mr. Shelton.

The only item of expense apart from home-grown foods was 1s. 6d. for pollard.

Exhibition.—Mr. C. Allen is to take all of the Mapleton Club pigs to the show on Wednesday morning, and as our schoolmaster (Mr. Watt) has made all arrangements on our behalf I cannot write any more about this at present.

PIG RAISING.

By EDDIE DE VERE, Mapleton State School (age 10 years).

I have only just become a member of the Pig Club at Mapleton State School. Being my first experience, I will try my best to write an essay on "Pig Raising."

I am ten years of age, and being on a dairy farm since I was seven I have always watched my father feeding the pigs, so I had a little knowledge of how to feed my

pig, especially when feed is limited; but since joining the club, and having the help of the Government pig expert (Mr. Shelton) by his lectures and explanation, it has come much easier to me.

In the first place, Mr. Shelton went to a lot of trouble selecting a pig for me, a Berkshire-Tamworth cross, which breed I find develops a nice marketable pig, not showing too much weight on the cheaper cuts, which if all pigs were bred this way I believe bacon would always command a good price, as there would be a lot less waste than at present, when the cheaper cuts have to balance up the dearer ones.

The method I adopted was first to select a place for the sty with good drainage, as it is the main thing in keeping the pig healthy. The next thing I did was to make a nice warm bed, as a pig likes to be clean and comfortable, and fed my pig three times a day, giving him as near as possible a balanced ration, such as skimmed milk, boiled maize, green wheat and barley. I also gave my pig two packets of Epsom salts a week with pollard. I also have a supply of charcoal in his sty, and I have found by this system that I am raising a good healthy pig; his weight when I received him was 30 lb. I have increased his weight in seven weeks to about 60 lb., and I hope to do better next time.

PIG RAISING.

By Douglas Wells, Kureelpa.

When Mr. Steele announced that there was to be a Pig Raising Club formed at the Nambour rural school, I asked Mr. Steele to write to Mr. Shelton to get me a pig, which was a purebred Berkshire sow from Gatton College.

I received my pig on 27th May, 1925, which was sired by the purebred boar "Murray Glen Star" out of a purebred sow named "Gatton Lady Conceit," and was born on 27th December, 1924.

When I received my pig my father and I built a sty, and I was able to have the use of it. For food I used milk and water as a drink, and corn, saccaline seed, lucerne, cane chaff, green saccaline, and various other green foods, which were all home-grown. The corn was boiled for the first three weeks so as it could be easily digested. The cost of raising the pig was £2 10s. For a mineral food I mixed up a mixture comprised of 20 parts charcoal, 20 parts wood ashes, 8 parts salt, 4 parts lime, 4 parts sulphur, and 2 parts sulphate of iron. For a run I let her run in a 2-acre pig paddock once a week. For bedding I used corn husks and grass, which I changed every fortnight. I also whitewashed my sty, which made it smell nice and sweet.

I bathed my pig a few times with soap and water, and also rubbed some linseed oil over her. I also gave her a couple of doses of linseed oil to liven her up.

I will exhibit my pig at the Nambour Show in the Pig Raising Club, and also as the best Berkshire sow over six months and under twelve months.

As my father allowed me to keep her, I decided to keep her as a breeding sow, which I will always look after.

HOW I SELECTED, FED, CARED FOR, AND HOUSED MY PIG.

By Arthur Kuch, Mapleton (age 12 years).

I bought my pig from Mr. R. M. Staves, Obi Obi, who breeds nothing but pure Berkshire pigs.

The mother of my pig is known in the Gatton College pedigree book as "Claremont Doris," 1575 B.H.B. of A. (sire) "Prairie Champion," 3127 B.H.B. of A.

My pig is named "Obi Queen," and she is now fifteen weeks old.

She has been fed principally on milk, chokos, pineapples (which she seemed to prefer to all other kind of food), also green weeds such as chickweed and milk thistles, also sweet potatoe vines, sweet and English potatoes boiled and mixed with the kitchen scraps, clean water, and green food for her midday meal, and the milk for morning and evening.

I paid £2 5s. for my pig when she was six weeks old. Mr. E. J. Shelton visited our place and had a look at my pig, and recommended me to enter her as a light baconer.

He also advised me to rub her with oil, which I have done. I also washed her with butter milk, and brushed her with a dry brush. I gave her clean hay in her sty every week.

The sty is nice and warm, being built of slabs, and has a bark roof. There is a nice little yard for her to run in.

In concluding, I may state my pig has not had any kind of grain. The full pedigree of my pig has been supplied with my essay.

HOW I SELECTED, FED, MANAGED, AND EXHIBITED MY PIG.

By Alex. Howe, Woombye State School.

Mr. Shelton, Instructor in Pig Raising, visited our school some time ago. He gave a very fine address to the pupils. He made his speech very interesting by telling about the different countries in which pig raising is carried on as an industry. Mr. Shelton told us also about marketing, and compared Australian markets with those of Denmark and America.

I was very interested in the address, and wanted to join in the pig competition at the Nambour Show.

One day on a visit to a friend, Mr. Bignell's pig farm, I was looking at his pigs.

They were Berkshires, and I learned were good pigs both for bacon and breeding purposes.

I was allowed to have my pick. The one I selected had a white patch on its ear, but the others were too small.

My pig had a fair amount of milk until the wet weather, when our cow got very low in her milk, and then I had to give the pig pollard.

Susy, as we named her, got all the house scraps as well as boiled pumpkin and potatoes. Every morning I gave her some green food as well as some sugar-cane and charcoal.

I soon got her very quiet, and was able to brush her every morning.

Her shelter was always kept well stocked with dry grass to keep her warm at night.

The day before the show I was very busy. I gave her a good bath in softsoap.

On show morning Mr. Bignell came round and took her up in his motor-truck.

A SUITABLE CLUB PLEDGE.

I pledge my head to clearer thinking,
My hands to larger service,
My heart to greater loyalty, and
My health to better living for my
Club, my Community, and my Country.

MARKETING PIGS IN QUEENSLAND.—IV.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The marketing of his products is claiming much closer attention from the man on the land, and in this series Mr. Shelton describes how the farmer's pigs are handled at the selling end. In previous instalments several marketing systems with which Queenslanders are familiar were reviewed, and in the fourth article are many points of equal interest to the wide-awake pig-raiser.—Ed.

The Sale of Stud Pigs.

Although breeding pigs for sale as stud animals may scarcely be regarded as a separate and distinct branch of the pig industry in Queensland, it is one of the avenues through which larger numbers of pigs are being marketed each year with, in many instances, excellent returns to the breeder.

As with other phases of pig-raising there are certain definite lines of action which must be strictly adhered to if it is hoped to establish one's self successfully in the business and to create a demand from the four quarters of this and the sister States.

First and foremost the stud pig breeder must associate himself with the membership of the Australian Stud Pig Breeders' Society (formerly the Berkshire and Yorkshire Society of Australasia), of which a branch has been in operation in this State for some years. Full details as to the scope of this society, its objective, its membership, &c., may be obtained at any time from the secretary, Mr. R. G. Watson, of Inns of Court, Adelaide street, Brisbane, or from the writer who is a member of the Council of the society.

Membership in this society is necessary, for the reason that the stud pig trade has grown to such an extent throughout Australia as to require the publication annually of a Herd Book in which are recorded the registered pedigrees of stud boars and sows in each of the several breeds of pigs in which breeders here are interested—viz., Berkshires, Large and Middle Yorkshires, Tamworth, Poland-Chinas, Duroc-Jerseys, British Large Blacks, and Gloucester Old Spots. These, in fact, are the only recognised pure breeds of pigs in Australia at the present, though, of course, there are many other pure breeds of pigs in countries overseas.

Membership in the society gives a breeder the right (on payment of certain fees) to register approved boars and sows; in fact only pigs the property of members are accepted for registration, and now that it is generally recognised among stud pig breeders that an animal's stud value is to an extent based upon its eligibility or otherwise as far as the Herd Book is concerned, it becomes necessary on entering into the stud business to bear in mind that buyers will in almost every instance first require to be informed as to whether an animal is eligible for registration or has been registered before they will make an offer at public auction or by private contract for any individual animal they fancy. Many of our leading Agricultural Show Societies, notably the Royal Agricultural Societies in the other States and several country shows and the Royal National Association of Queensland only now accept for competition in the stud classes animals complying with the registration clauses, *i.e.*, that all animals—over six months in the Southern States and over twelve months in Queensland—be already registered, and that all animals entered as under these ages be eligible for registration, which indicates that they must be the progeny of a registered sire and dam.

One of the principal objects of the Stud Pig Breeders' Society is to promote fellowship amongst the pig breeders of Australia and to further their mutual interests generally in so far as the breeding of stud pigs is concerned, hence the value of associating one's self with a body of men and women of similar interests and ambitions.

Breeders are reminded that a pamphlet entitled "The Australian Stud Pig Breeders' Society" can be obtained on application to Mr. R. G. Watson or the writer, and that this pamphlet gives a host of other detail apart from rules of membership and other particulars.

Advertising.

Secondly breeders of stud pigs will need to spend some money on advertising if they wish to build up a successful business. The following excerpt from a prominent pig breeders' journal published overseas is worthy of commendation:—

> He who has the goods to sell
> And goes and whispers down a well,
> Is not as apt to collar the dollars
> As he who climbs a tree and hollers.

There is much truth in this so far as stock breeding is concerned, as has been proven many times by men who have had the goods to sell. But the best form of advertising after all is the class of stock one sends out, for sending a good pig into a new district will do more to advertise one's stud than many pounds spent on newspaper advertising. Nevertheless, the latter medium is not to be despised, though the choice of the journals in which one advertises is a matter of very considerable importance. Newspapers and journals specialising in stock breeding are, of course, the best business getters; they are the ones that "pull" the business as the advertising contractor would say. Another form of advertising too aften overlooked is that embodying the breeder's name and the class of stock produced as stencilled on the boarding of which the pig crates are constructed. The writer made a speciality of this years ago when in charge of the stud piggery at the Hawkesbury Agricultural College, Richmond, N.S.W., and has since noticed college crates on farms as far north as the Atherton Tableland in Queensland and as far south as the South Gippsland district in Victoria, and in many other centres and show yards.

Live Stock Auctioneers.

The breeder of stud pigs will find that it pays handsomely to make a good friend of the live stock auctioneer selected to attend to various matters connected with this business. This is a far more important consideration than might appear on the surface, as the writer's experience has demonstrated, and as correspondence with various stud breeders and stock salesmen will show. From the standpoint of the auctioneer, who has an established connection and who is ready to do business, it is necessary that he should have full particulars of animals available for sale with extended pedigrees showing their breeding, prize records, &c., and that he should have the price crated on rail or steamer (or as required) at which the seller is prepared to part with any particular animal. Breeders will do well to take the auctioneer into their confidence in all these matters, and to co-operate in every way with a view to building up the business.

Business Correspondence.

To be successful the stud breeder must be prepared to answer promptly and in detail all correspondence and inquiries relating to the purchase or sale of stock or produce. Nothing is more discouraging to would-be buyers than to fail to receive replies to correspondence promptly, or that when a reply is received to find that the information supplied is not complete. Many of the most successful men have found that the typewriter has proved a boon, while having proper letterheads and endorsed envelopes helps considerably. Every letter going forward should carry some advertising matter relative to one's stud, hence the necessity of illustrated posters, dodgers, or stud catalogues. The Secretary of the Stud Pig Breeders Society stands prepared to quote for the supply of all necessary literature, letterheads, pedigree forms, litter records, transfer forms, &c.

Quoting Stock.

The stud breeder should be prepared to quote all available animals at a price to allow of cartage, crating, feeding, and delivery to the buyer's nearest railway station or wharf, or to quote for the pig crated on rail or steamer at point of despatch. A great deal of time, correspondence, and annoyance will thus be saved. Many breeders simply quote the price at which they are prepared to sell the pig, then after despatch they send a belated statement showing amount due for cartage, crating, and other expenses, but this is extremely unsatisfactory and will do more than anything else to kill business and give one a bad reputation.

The seller should always be prepared to extend liberal consideration to the buyer and to immediately replace unsatisfactory animals, animals that die in transport or that otherwise prove bad purchases. Confidence is the soul of business so it is said and it has its application in building up a stud trade as elsewhere through life.

Send out nothing but the best, and when quoting always make it clear to the purchaser whether the animal is perfectly marked and up to stud book standard or otherwise.

Isolation Pens.

It will pay to have a set of isolation or "hospital" pens in which to quarantine all new purchases for at least three weeks after their receipt and before they are permitted to mix with the other stock on the farm. Similarly avoid sending out animals infested with lice or fleas or in an otherwise unsatisfactory condition. An instance came under notice only a few weeks ago in which an enthusiastic buyer made a purchase without first inspecting the animal. He was intensely disgusted when the animal arrived at the railway station to find that it was heavily infested with lice, was in a filthy condition, and had a bad cough. Such a purchase proves disastrous to both the buyers' enthusiasm and to the sellers' reputation, and the stud pig trade suffers accordingly. All new purchases should be quarantined for thirty days whether there is any indication of disease or not.

Purchasing Fresh Blood.

The purchase of prize-winning animals and their introduction into the stud will do much to assist breeders generally in popularising their studs. The writer could relate numerous instances in which the purchase of some well known strain of blood has done much to put a new breeder on the map as far as stud breeding is concerned, and the matter of expense should not necessarily be the only consideration when new purchases are to be made, though there is no advantage in paying any more than is necessary for any individual pig.

The stud sales, now an established feature at the Royal National Show, Brisbane, and at other Royal Shows, are definite proof that there is an increasing demand for all classes of stud stock. This year's Jubilee Show Sales were markedly successful, and higher and more consistent prices were paid and received than at any previous Brisbane Show. Of course, the general average of quality of the animals offering was superior, and there were more buyers present, and, in general, seasonal conditions have been favourable throughout the State. On the other hand, there was a much larger offering of stud pigs this year, both from local and interstate studs. Prices of from 15 to 29 guineas for selected pigs were a feature of these sales, this, in most instances, being for yearling pigs, though the two highest priced pigs of the show sales were less than nine months old. The breeder securing highest sale average recorded an average of over 20 guineas for his offering. This indicates that there is profit in pigs provided one has the right class to offer.

PLATE 65.—COW PEAS GROW IN PROFUSION ON THE ATHERTON TABLELAND.

ROYAL NATIONAL EXHIBITION.

CONVINCING EVIDENCE OF QUEENSLAND'S IMMENSE AGRICULTURAL AND PASTORAL CAPACITY—A STRIKING REFLEX OF THE RICHNESS OF HER FORESTS, FIELDS, AND PASTURES—A PAGEANT OF PROSPERITY AND A TRIUMPH OF ACHIEVEMENT.

The attainment of high standards, under the stimulus of healthy competitive effort, and with a strong incentive to excel, is evident in wonderful results every year at the Brisbane Exhibition.

The Jubilee Show of 1925—it is just fifty years since the Royal National Association held its initial display at Bowen Park—was the most successful of a long series. The general happy social condition of Queensland was reflected in vast daily attendances of eager, well-dressed, and orderly crowds.

Standard stock breeds; principles and practice of modern farming; improvements in agricultural machinery, implements, communication, and transport; and the intricacies of business procedure as applied to primary industry, were all typified or represented.

On show was an extraordinarily fine representation of every breed of stock that thrives on Queensland's broad and generous pastures. In other departments was illustrated every phase of farming, making the whole exhibition comprehensive and complete.

The Show right through was a smooth-running model of thoroughness, an advertisement in brilliant tones and bold relief of vibrant prosperity. It produced plain and convincing evidence that Queensland, so richly endowed in soil and climate, offers, in a greater degree perhaps than any other land, every opportunity to the skill, will, and character of men.

The great agricultural event of Queensland's year was opened officially on 12th August by His Excellency the Governor-General, Lord Forster, in brilliant sunshine amid beautiful and historic surroundings at Bowen Park. The day was typical of Queensland's early spring, genial warmth tempered by a breeze in which there was just a lingering suggestion of wintry chill.

Every day of Show Week enormous crowds gathered around the green arena in which every breed of stock for which Queensland is winning fame and public interest in exhibits, judgments, and awards never seemed to wane.

A happy experience of the week was the meeting with men whose names are known and honoured wherever farmers forgather, whose knowledge and persevering industry were represented so well in stock that would win attention and command commendation in any show ring. All the leading beef and dairy breeds were strongly represented, and visitors from other States were impressed most favourably with the quality of Queensland cattle that came up for judgment and paraded for review.

Fine horses—turf favourites, ponies, pacers, hacks, and draughts—are an attraction at any Queensland show, and the stud and other classes presented this year for the approval of a critical crowd were full of equine quality. Each day the fine Clydesdales provided by the Government for breed improvement were shown and they shared with a magnificent troop of police rides from the Government Remount Station extraordinary popularity.

Plate 66.—At the Brisbane Show.

1. Arrival of His Excellency Lord Forster, Governor-General.
2. The Governor-General officially opens the Show.
3. The Governor-General's Speech being broadcasted.
4. The collection of trophies.
5. Presentation of prizes by Lady Forster.
6. Steele Rudd tells a story.—*Left to right*—Jim Philp (*Courier*); A. H. Davis (*Steele Rudd*); J. Reid (*Q.A.J.*)

See opposite page.]

Among the strongest and best-staged pavilion features were the Court of the Department of Agriculture and Stock and the District and One Man Farm Exhibits.

The display of the Forestry Service was particularly commendable, and provided valuable object lessons in economical forestry to the people in whom is being awakened a distinct forest sense.

The practical modern educational policy of the Government was demonstrated arrestingly both in regional competitive displays and the products of the students of our technical and rural schools. The rural school work generally was admirable, and served as a record of the practical progress that has followed the initiation by the Education Department of a broad-visioned instructional policy.

The absence, through indisposition, from the official functions connected with the Show of His Excellency the State Governor, Sir Matthew Nathan, was generally regretted.

Another remarkable feature was the great display of motor vehicles that filled the John Reid Hall and associated annexes.

The Fruit Section contained a remarkable range of temperate and tropical products, and probably no better collection, in variety and excellence, could be presented in any other country.

Among those present at the official opening ceremony besides the Governor-General and Lady Forster were Hon. W. N. Gillies (Premier) and Mrs. Gillies, Hon. E. G. Theodore (former State Premier) and Mrs. Theodore, Hon. W. Forgan Smith (Minister for Agriculture and Stock), Messrs. E. Graham (Under Secretary), R. Wilson (Assistant Under Secretary), E. G. E. Scriven (former Under Secretary), Ernest Baynes (President, R.N.A.), J. Bain (Secretary, R.N.A.), and H. C. Quodling (Director of Agriculture).

THE AGRICULTURAL COURT.

REPRESENTATION AND REVIEW OF DEPARTMENTAL ACTIVITIES.

This year the Court of the Department of Agriculture and Stock, attractively and artistically arranged, presented many new and striking features. A right atmosphere was created and a harmonious colour scheme added to an appropriate setting of what really was a most practical exposition of the work coming within the scope of the Department. Through their activities and applied energies, so fitly illustrated, officers of the Department are giving signal service to primary producers whose industry is such an important component in the complex social and industrial life of Queensland.

In the Court the observer, the inquirer, and the student were brought into direct touch with Queensland's great basic industries—Wool, Sugar, Maize, Wheat, Dairying, Cotton, and General Agriculture. To them was presented an opportunity of gaining a close and clear knowledge of the avenues of effort, both in field and laboratory, in which officers of the Department are continuously and efficiently working.

As the Brisbane Exhibition is a microcosm of the State, so the Court of the Department was a representation in miniature of a most important section of the Public Service.

The wool display this year was a striking one, and indicated effectively the work of the Sheep and Wool Instructional Staff.

The activities of the Bureau of Sugar Experiment Stations were well represented. New varieties of cane were exhibited, and the whole display was worthy of the State's greatest agricultural enterprise.

This year's cotton display was less spectacular, but more educational than those of previous years. More attention is being given to cultural methods and this phase was well presented.

The pig section was a new and special feature of the Court, and made a strong appeal to the practical farmer.

The part the Stock Experiment Station at Yeerongpilly takes in the general scheme of service to the stockowner was clearly demonstrated by specimens, cultures, diagrams, and printed informative matter which set out simply the work of that vigorous institution in the investigation and combating of stock diseases.

The Division of Entomology and Vegetable Pathology provided an exhibit that attracted not only those who are interested economically in our insect life, but also the nature student. Life histories of various insects were set out graphically and the whole was illustrative of the intimate relationship of science with agriculture.

The fruit exhibit was a most interesting one and covered as far as practicable the work embraced by the Field Staff of the Fruit Branch.

The "Queensland Agricultural Journal" was also well represented. The "Court of Agriculture" generally was one of the most attractive features of this year's pavilion displays and was fully in accord with the policy of progress and advancement of the State, and served to demonstrate fully the important work of the Department.

In order that each succeeding year's display may indicate the advancement and development taking place within the Department itself, certain changes and additions were made to the Court which represented an improvement in the general design.

The exhibits were prepared by the Instructor in Sheep and Wool (Mr. W. G. Brown); Director and Instructors in Agriculture and Assistant Instructors from the Southern, Central, and Northern Districts (Messrs. H. C. Quodling, A. E. Gibson, C. Clydesdale, C. McKeown, G. B. Brooks, and N. A. R. Pollock); Managers of State Farms at Roma and Gindie; Cotton Specialists and Graders (Colonel Evans, Messrs. Wells, Peters, and Gudge); Instructor in Pig Raising (Mr. E. J. Shelton); Officer in Charge, Stock Experiment Station, Yeerongpilly (Mr. C. Pound); Poultry Expert (Mr. Rumball); Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby); Government Botanist; Director and Instructors in Fruit Culture (Messrs. A. H. Benson, G. Williams, Prest, and A. Thorburn); and the Government Entomologist and Staff (Messrs. H. Tryon, J. L. Froggatt, H. Jarvis, Somerville, and Hehnsing). Designs and lay-out arrangements were in the hands of Mr. H. W. Mobsby, F.R.S.A., who set up the Queensland exhibit at Wembley.

THE CENTRAL TROPHY.

The Central Trophy, a terraced structure 30 feet long by 8 feet high, with a width of 12 feet, was utilised for the display of cereals in grain and ear, roots and fibres, tropical and semi-tropical weeds and plants poisonous to stock, agricultural products arranged in sequence with a large number of photographic illustrations, in order to afford the fullest possible information of value.

Maize.

Prominently displayed on the trophy was a highly educative exhibit of maize. Its purpose was to illustrate the work of the Department in the improvement of this all-important cereal, particularly in the production of specific types of grain. The educational section which dealt with a number of important plant characters associated with seed selection was worthy of and received the closest scrutiny. It served to impress growers and others interested in maize-growing with the importance of continuing such useful work by the Department systematically from year to year.

1

2

3

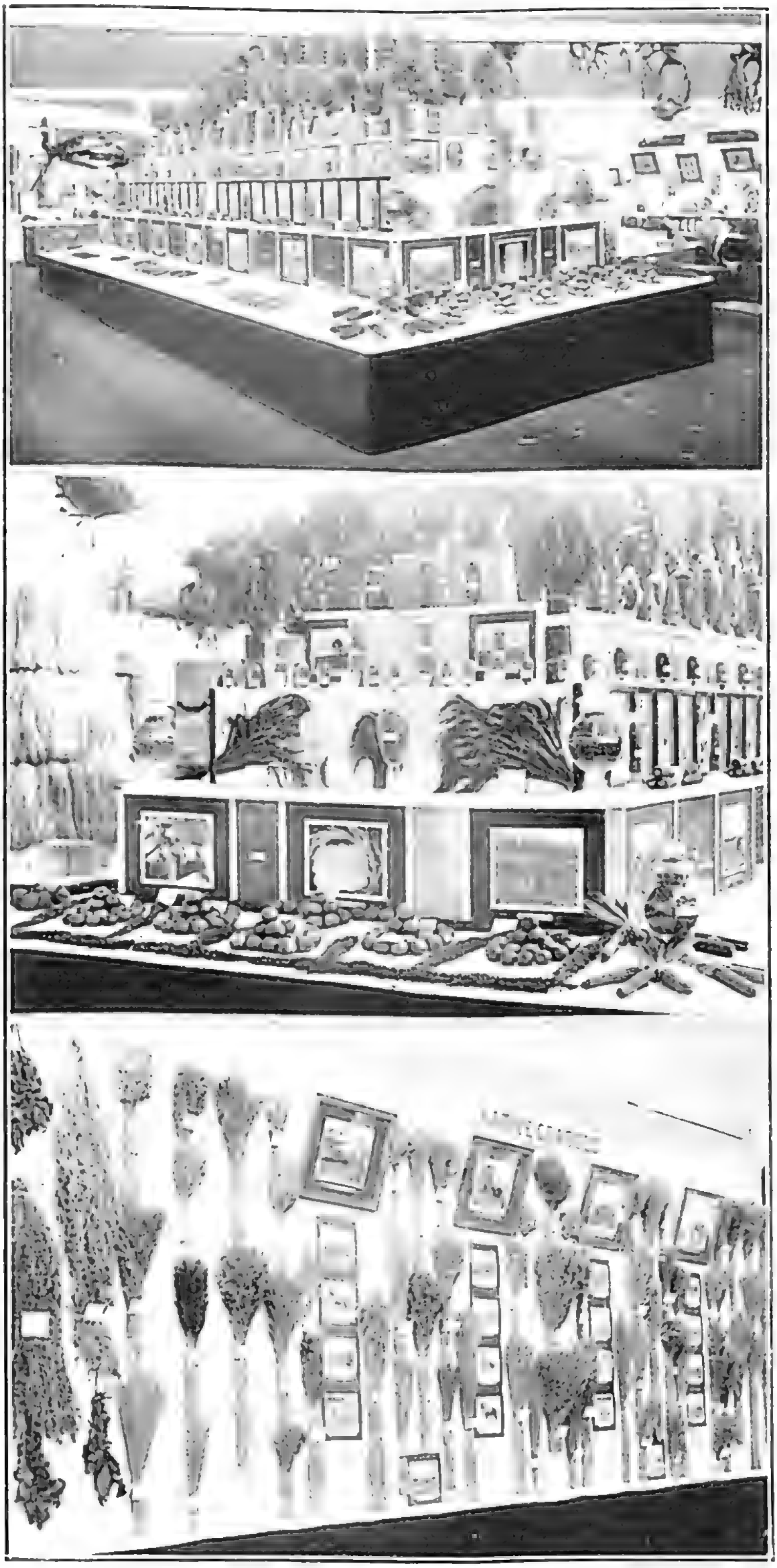


Plate 67.—In the Court of Agriculture.

1. Central Trophy, 2. Display of Wilt-resistant Tomatoes.
3. Panel of Native Grasses.

1

2

PLATE 68.—DISTRICT EXHIBITS.

1. "A" GRADE, WEST MORETON, THE WINNING EXHIBIT; WIDE BAY AND BURNETT, AND NORTH COAST OF NEW SOUTH WALES WERE 2ND AND 3RD RESPECTIVELY.

2. "B" GRADE, KILCOY, 1ST.

1

2

PLATE 69.—DISTRICT EXHIBITS, "A" GRADE.

1. Wide Bay and Burnett. 2. North Coast of New South Wales.

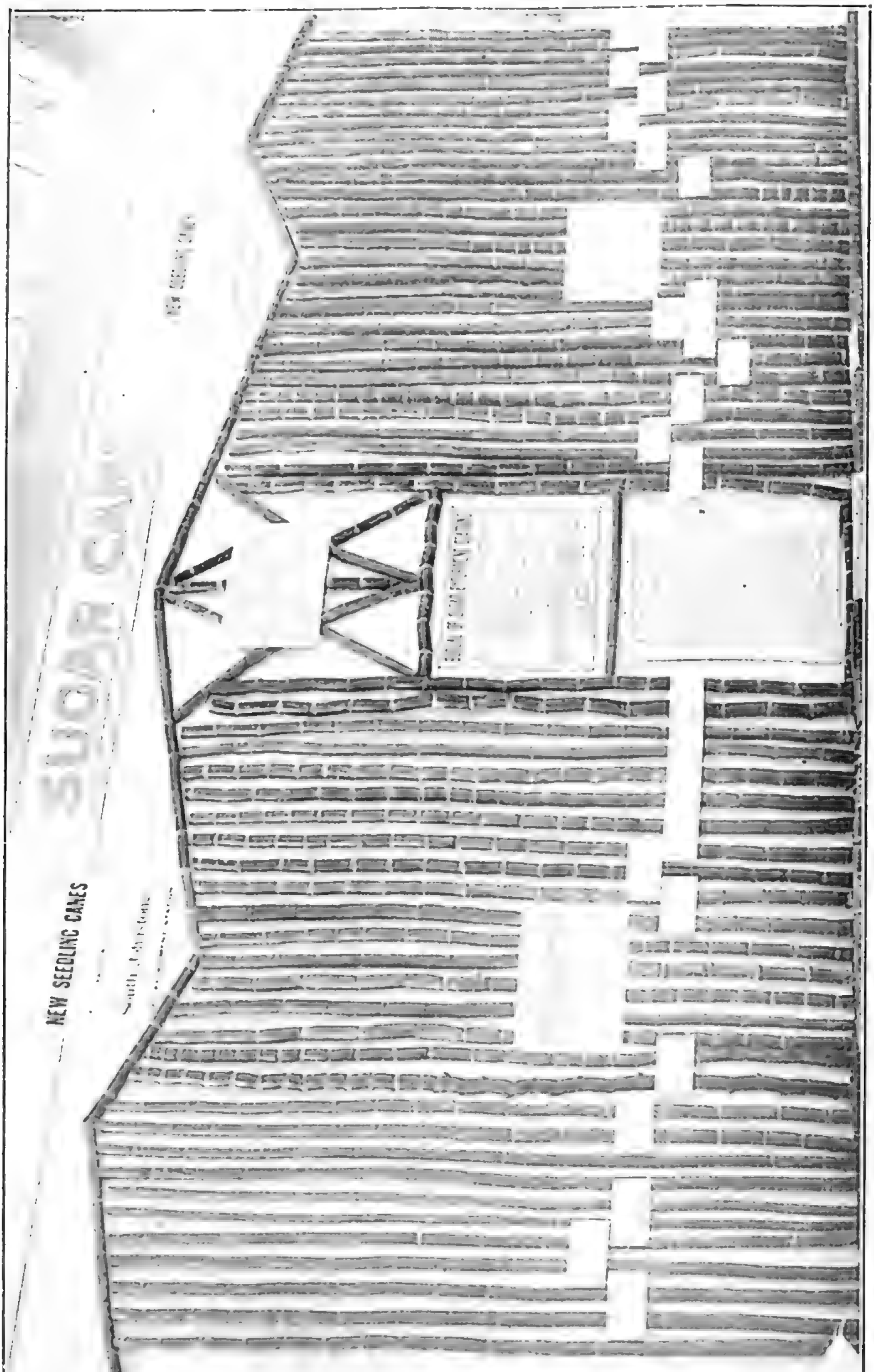


Plate 70. A Panel in Sugar Cane—Classes and Varieties Exhibited by the Bureau of Sugar Experiment Stations.

PLATE 71.—1. FIBRE TROPHY IN THE COURT OF AGRICULTURE. 2. THE JOURNAL CORNER—BRENNAN BUTTER BOXES ON LEFT.

Apart from the question of grain types, there is ample evidence of the practical value of this work in increased production resulting from the use of high-producing strains of seed, authentic yields direct from the threshing machine of upwards of 100 bushels per acre having been secured from field crops.

The grower of maize, like the producers of other primary products, is naturally deeply concerned with the factors that make for increased yields, also in any labour-saving device that tends to reduce the cost of production.

Until quite recently the method of harvesting and threshing grain had not shown any reduction in costs; as a matter of fact costs for various reasons were on the increase. Last year, however, the inventive genius of a Queenslander, Mr. George Iland, of Toowoomba, produced a horse-drawn, engine-functioned machine for the complete harvesting and bagging of maize in the field. As the cost of the operation worked out by the purchaser of one of the machines was 2½d. per bushel, it was apparent in districts where the machine can be used to advantage that the maize-grower will now be on a better footing than formerly.

Wheat.

In the two sections of the Court devoted to wheat that on the Central Trophy dealt specifically with the chief commercial varieties, included in which was a selection of several of the better-known Departmental wheats which are coming into favour. These wheats were shown attractively in sheaf and grain.

Wheat-growing as an industry was depicted in photographic and dioramic views that also illustrated the work of the field officers engaged in carrying out fertiliser and propagation trials on privately-owned wheat farms, and the testing also of the rust-resisting and field characteristics of a large number of varieties. In this way the work of the Department is brought into direct touch with, and is designed for, the express purpose of advancing the practical interests of those engaged in wheat farming.

Another interesting section of the Court was a display of the highly-technical work of wheat-breeding carried on by the manager of the State Farm at Roma (Mr. Soutter). In chronological order this exhibit traced the inheritance of certain visible plant characters, and illustrated the effect produced by the cross-pollination of two varieties of wheat. The work of this wheat-breeding station has been carried on for fifteen years, and through its agency some excellent varieties have been brought into cultivation. Striking results indicative of the value of scientific work of this description have already manifested themselves. In this connection it has been possible to transmit the rust-resisting quality of one parent plant to the progeny, even when the other parent of the cross was known to be susceptible to rust.

Broom Millet.

Millet of excellent quality was staged, accompanying which were descriptive notes on the cultivation of the plant and of the preparation of the product for market. This industry is self-contained, and a number of broom factories are working in Brisbane. A reasonably good market is offering here and in the South. It is generally recognised that importation of millet from Europe should be discouraged by every possible means, owing to the risk of bringing in the European corn-borer, an insidious pest which has caused enormous damage through its introduction to America and other countries.

Cassava.

A special exhibit was made of this product. The roots of cassava carry a high percentage of starch (averaging about 25 per cent.), which is the source of the well-known table product tapioca. Much interest has been aroused in Queensland by proposals for its cultivation as a base for power alcohol. The Minister for Agriculture (Hon. W. Forgan Smith) has arranged already with the Plane Creek Central Sugar Mill authorities at Mackay to grow cassava for this purpose. The Instructor in Agriculture for the Central District (Mr. G. B. Brooks) was recently sent to Java to arrange for a supply of cuttings of approved kinds to plant an area of 300 acres near the Plane Creek Mill. The first consignment of 5,000 cuttings

has arrived and has been planted. Everything points to this new enterprise having a favourable start, and as molasses will also be used for the manufacture of power alcohol there is good ground for an optimistic view respecting the production in the near future of an appreciable quantity of spirit for industrial and transport use.

Tropical.

An array of tropical products was staged by the Northern Instructor in Agriculture, Mr. N. A. R. Pollock, who has been experimenting for some time with certain crops to test their economic value. Several varieties of "Upland" rice, imported in the first place from Japan and Java, were shown in sheaf and padi, rice grain in the rough, prior to hulling and polishing.

Soya Beans.

Another product presented to public notice was Soya Beans. Queensland has no commercially-grown oil-producing seeds other than cotton, consequently attention is being given to this very valuable plant. Recently a consignment of approved varieties was imported by the Department of Agriculture from the Bureau of Plant Industry in U.S.A., and field trials are to be undertaken.

Included in the display was an assortment of seeds of a number of leguminous plants, certain varieties of which, notably Mauritius and Velvet Beans, are largely grown in the Northern sugar districts for green-manuring purposes.

Townsville "Lucerne."

A large plant of the so-called Townsville "lucerne" (*Stylosanthes mucronata*) was exhibited. Prior to its introduction and subsequent distribution pastures in the vicinity of Townsville were of indifferent stock-carrying capacity. In recent years a very great improvement has manifested itself in the condition of the cattle running on the town common, and in paddocks to which this plant has spread. Townsville "lucerne" is looked upon more as a weed in other countries, and, even here, is not much sought after by stock until the plant starts to form its seed; at this stage it is rich in flesh-forming substances. It adapts itself also to hard, clay-pan country. Seed has been distributed by the Department to districts where a nutritive fodder plant is likely to improve the native pastures, and it is also being spread by natural means, principally along the railway lines.

QUEENSLAND'S RICH NATURAL PASTURES.

A well-arranged exhibit of native grasses was contributed by the manager of Gindie State Farm, who collected them on the property. Gindie is used as a Stud Farm for the breeding of Beef Shorthorn cattle, Clydesdale and Suffolk Punch horses. A number of photographs of stud stock belonging to this institution were shown amid the grass samples, and served to emphasise the quality and condition of the stock and the grasses on which they are depastured.

Tobacco.

Added interest was given to this section by the models of cigar and pipe tobacco-curing sheds, constructed to scale, in proximity to which were standard samples of both kinds of leaf. Trade requirements are more exacting than formerly and growers, to be successful, must supply a high-quality product, and in doing so may demand a better price. In the Bowen district, cigar leaf tobacco-growing has been carried on for a number of years, and the product is treated for market in Australia. Proper curing houses, in which the temperature may be controlled, are essential. As the manufacturer of pipe tobacco demands bright, aromatic, flue-cured leaf of a certain standard of quality, it follows that present and prospective growers must conform to requirements. Excellent tobacco is also grown in the Texas and Inglewood districts.

English Potatoes.

A collection of potatoes drawn from Departmental Experiment Plots at Townsville was staged for the purpose of illustrating that food crops of this nature are readily grown, in winter, in the Tropics, a circumstance full of significance to growers who are in a position to cater for the Northern trade.

PLATE 72.—MODEL TOBACCO CURING SHEDS IN THE AGRICULTURAL COURT.

PLATE 73.—QUEENSLAND STATE CANNERY PRODUCTS.

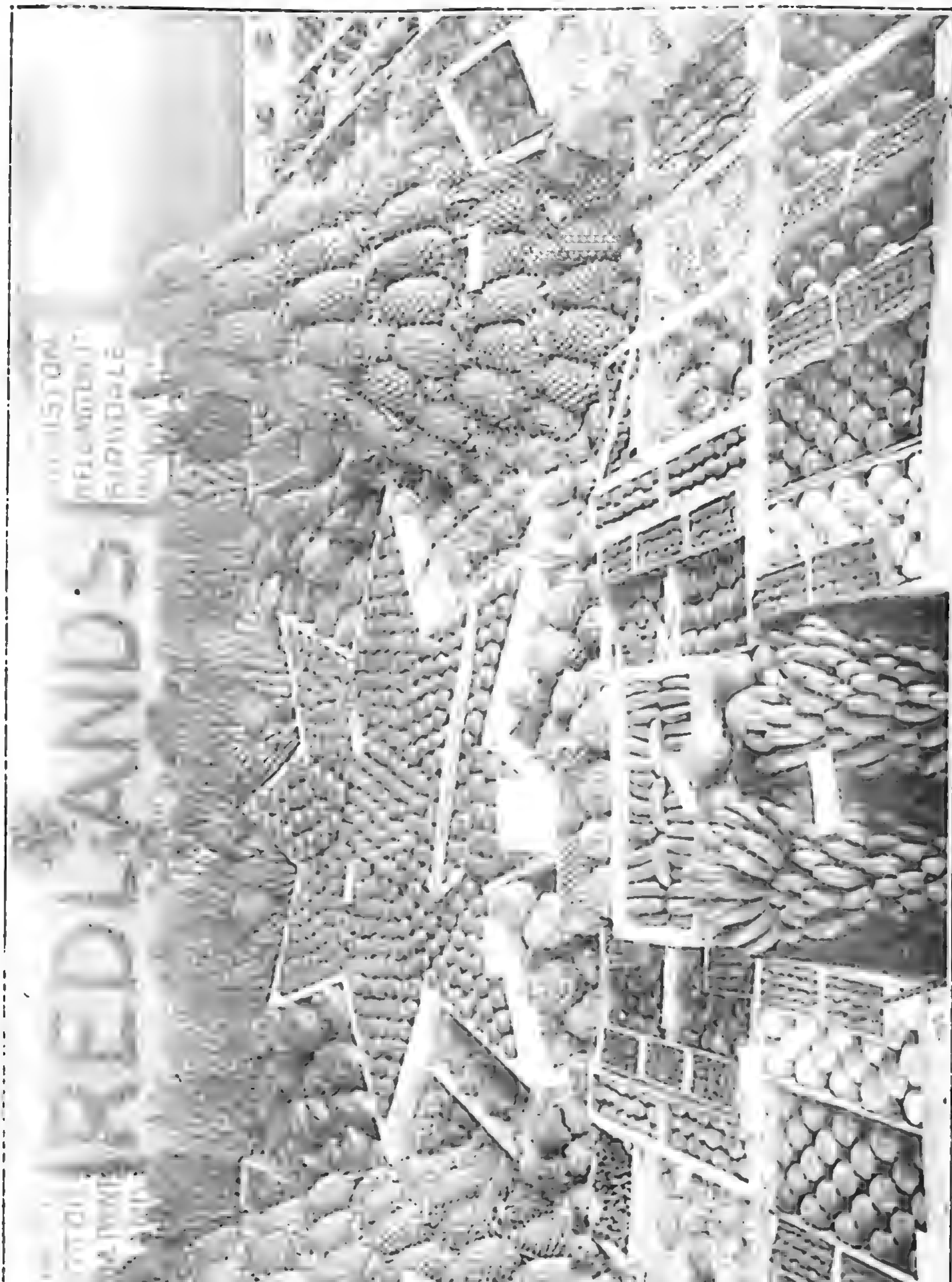


Plate 74. Fruit from the Redlands, Moreton Bay.

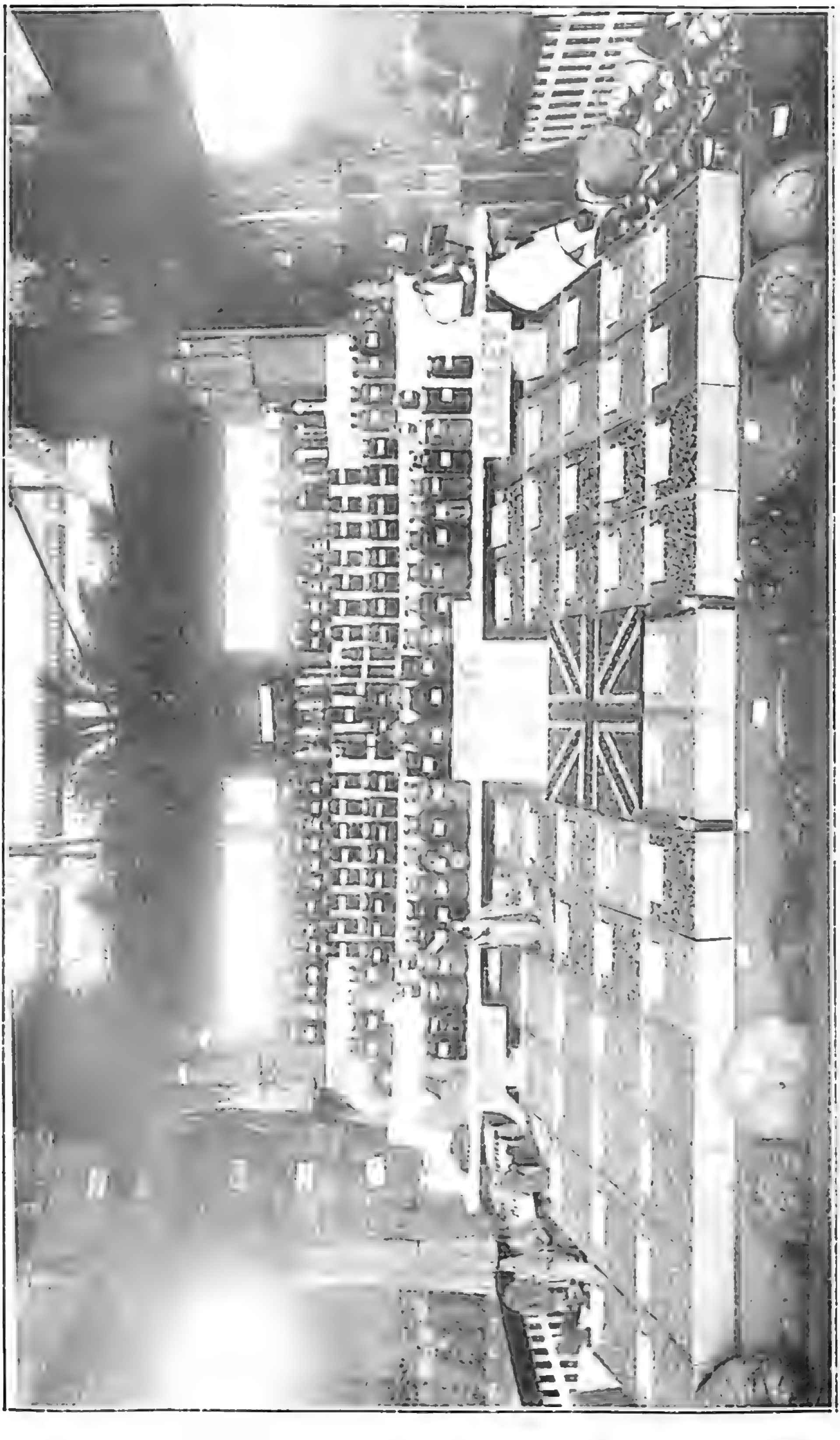


Plate 75.—The Winning Display in the "One Man Farm" Competition. Staged by Mr. A. Noble, Glen Innes (N.S.W.).

THE DISTRICT EXHIBITS.

This feature of the show afforded once again an excellent opportunity of studying the productive capabilities of rural Queensland. This year the Northern Districts of New South Wales also sent an exhibit. No fewer than four regional competitors entered for the senior division—including both primary products and manufactures; and four also for the primary products only, thus making up a very fine range, and one which covered the greater part of Southern Queensland, in addition to the North-Eastern corner of the adjoining State. The variety and quality of the products generally commanded admiration, and showed clearly the tremendous opportunities which exist for development both in products and manufactures, if we had the population not only to produce, but also to consume the output of field and factory.

WEST MORETON—FIRST.

(1,194½ points out of a possible 1,558.)

The advantages of energetic team work amongst the agricultural societies of the assigned area, coupled with great development both in primary and secondary industries, was strikingly evident in the West Moreton display. Mr. H. W. Watson again acted as principal organiser, and he was ably supported by the work of the local societies of Ipswich, Gatton, Rosewood, Laidley, Esk, Boonah, Marburg, Toogoolawah, and Lowood. A representative from each of those societies attended the show in Brisbane, thus materially assisting in the orderly and effective arrangement of the exhibits.

The general effect of the display was remarkably good, 76 points being secured out of a possible 80 for "effective arrangement." In dairy produce this collection was beaten only by Northern Rivers (N.S.W.), and then only by a point and a-half. It was equal with Wide Bay and Burnett in "foods," including hams and bacon, canned meats, honey, and bread. Under fruits and vegetables, West Moreton scored well, though not so high in the aggregate as several of the others; but English potatoes formed a strong element, being equalled only by New South Wales and surpassed by none. Tropical fruits were mainly contributed by Marburg. Some clean attractive citrus fruits from Grantham and Esk formed a pleasing feature. Maize and maize products formed an important and attractively arranged element in the display, though wheat, which is not supposed to be a regular product of this area, came out well owing mainly to contributions from the Lockyer and Esk districts. It was in manufactures and trades that West Moreton particularly shone. The advantage enjoyed in possessing such institutions as the Queensland Woollen Company and the various foundries and engineering works, in addition to timber working factories and those engaged in the production of various foodstuffs (stimulated as these industries are by the proximity of large supplies of coal), has no doubt much to do with the strength of this phase of the district exhibit. For manufactured textiles the full quota of points was obtained, and the exhibit in this section was undoubtedly an attractive one. In the section "minerals and building materials," a less commanding position was taken; but timbers from Esk, Boonah, and Yarraman secured 23 points of a possible 25 in that particular section. Tropical products were not as well represented as perhaps they might have been, but weakness in comparison with Wide Bay, for example, was due to the fact that West Moreton is not a sugar growing district, though in most of the included areas cane is grown, principally as fodder. For wines and aerated waters this district scored better than either of the others, gaining in all a total of 20 points out of 25. Tobacco is not an industry bulking at all largely in this district, but the farms were able to contribute cured leaf in sufficient quantity to win 75 per cent. of the maximum points. In fodders, the scoring was high under almost every heading, and this was to have been expected in view of the large output of hay and chaff of all descriptions from the included areas. Wool, both greasy and scoured, formed another fairly strong division, though in this respect the New South Wales display had a decided advantage. Enlarged photographs, with which the walls were adorned, were of excellent quality and secured the maximum points. The central feature in the decorations was a revolving globe of wool bearing, amongst other devices, the slogan, "If it's good, we grow it. If we grow it, it's good."

WIDE BAY AND BURNETT—SECOND.

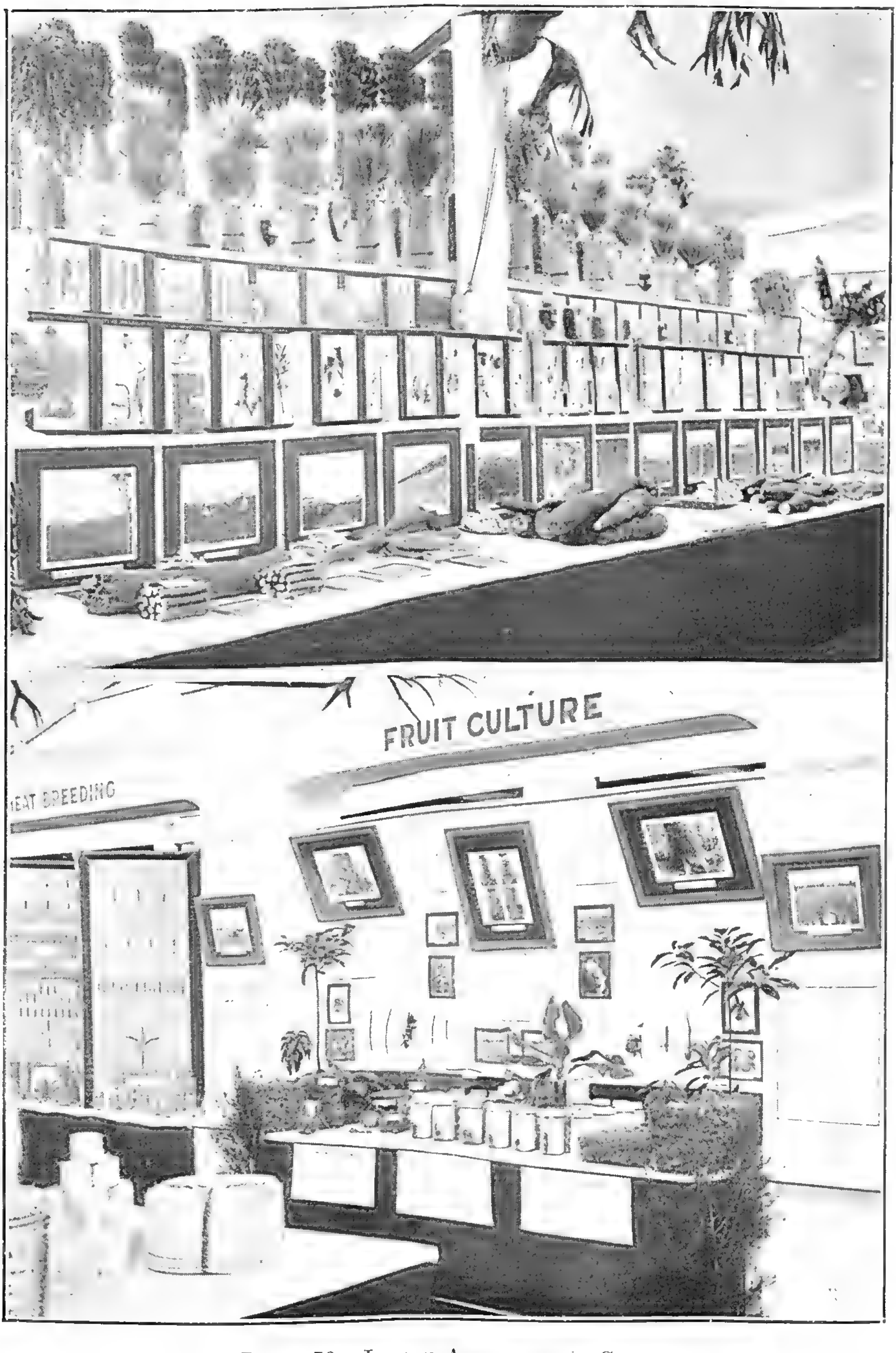
(1,182 Points.)

The districts included were Maryborough, Pialba, Gympie, Bundaberg, the fertile areas of the Mary Valley and of the Blackall Range, and productive tracts further from the coast such as Gayndah, Kilkivan, Wondai, Murgon, Childers, Degilbo, Nanango, and the various sub-districts of which these towns form the commercial centres. The areas indicated include some of the most productive lands in Southern Queensland, famous for their annual output of sugar, butter, maize, bananas, pineapples, citrus fruits, and possessing at the same time abundant supplies of coal and other minerals, as well as timber. Maryborough, too, is noted for possessing the largest engineering works in the State in Walkers Limited. Bundaberg, in addition to its large foundry, has several sugar mills, including Bingera, Fairymead, Qunaba, and Millaquin, and has also a refinery and distillery. The two large mills in the Isis, and the smaller mills at Gin Gin and Bauple, as well as the Moreton Central Mill at Nambour, are all within the area allotted to the Wide Bay and Burnett, so that the field from which exhibits may be drawn is a rich and varied one. Coming within 13 points of the top score, this district has every reason for congratulation on its splendid showing, and the organiser, Mr. H. Basford, only needs a little more backing from the district societies to enable him to win for his district the coveted premiership. Wide Bay secured equal points with the best in the "food" division, and distanced all in "tropical products." Sugar-cane was represented by fifty-two varieties, all well grown specimens, principally from Bundaberg, Childers, and Nambour. Fresh fruit was another strong class, securing 55 points out of a possible 60, the citrus from several areas forming in itself a very fine exhibit. In grain, though only 2 points short of the winners, Wide Bay was considerably behind Northern Rivers. Maize is, of course, a leading product of some of the included areas, and higher scoring for this cereal might have been expected; the exhibit, nevertheless, was a fine one, chiefly from the South Burnett. On the other hand, wheat, which is not generally regarded as associated with this part of Queensland, was shown in ten varieties, and we learn that the State Wheat Board has recommended the planting of larger areas. Formerly Nanango had a considerable acreage under wheat. Woodwork was well represented, and included joinery from Maryborough. Metal work was an outstanding feature, both in iron and brass, the principal foundry making an instructive display. In minerals and building material 75 per cent. of the possible score was gained. Timbers were less conspicuous than they might have been, but this was compensated by the gold and various mineral specimens from Gympie, Kilkivan, Gayndah, and Biggenden, with coal from the rich seams of Howard. In tropical products, apart from sugar, Wide Bay gained maximum points for rum, coffee, rubber, and vegetable oils, and 20 points (out of the possible 30) for exhibits of cotton. With 114 points for fodders, Wide Bay came next to West Moreton, tieing with the winners in such items as pumpkins and farm seeds, and showing a 9 to 6 superiority in broom millet. In the food section a total of 159 points was gained (the same number as West Moreton), and in honey and confectionery the scoring surpassed that of the winners, though falling somewhat short in other divisions.

NORTH COAST, NEW SOUTH WALES—THIRD.

(1,170 Points.)

It was distinctly pleasing to have Northern New South Wales again represented at Bowen Park, and with the improved communication now being provided in the Kyogle railway regular competition from the Rivers may be expected. With the present difficulties of transport it was distinctly creditable that the organiser, Mr. T. J. Ford, of Grafton, should have fallen short of the top score by only 24 points. The whole was under the control of the North Coast Agricultural Societies' Association, which embraces an area of 100 square miles, and includes the following districts:—The Tweed, Mullumbimby, Bangalow, Alstonville, Coraki, Nimbin, Lismore, Casino, Kyogle, Grafton, Ulmarra, Maclean, Coramba, Bellingen, Dorrigo, Guyra, Glen Innes, and Tenterfield. Thus both coastal and tableland areas were included, and



1

2

PLATE 76.—IN THE AGRICULTURAL COURT.

1. Cassava Exhibit (Central Feature). 2. Work of the Fruit Branch illustrated.

PLATE 77.—INTERESTED VISITORS AT THE SHOW.
Left to right—Mrs. E. G. Theodore, Hon. E. G. Theodore (former State Premier), Hon. W. N. Gillies (Premier), Mrs. W. N. Gillies.

the display was a most creditable one, representative of the great primary industries of these districts, and embracing manufactures, though without the advantages of large establishments such as those in Ipswich and Maryborough. The existence, however, of so famous an institution as the North Coast Co-operative Company at Byron Bay led to the expectation that scoring in dairy products would be high, and this was justified by the event, as the figures under each subheading of this section were highest, with the exception of a single point lost on eggs. The noted Guyra and Glen Innes districts, supplemented by exhibits from Dorrigo, are credited with the very fine display of English potatoes, some sixty varieties being shown. Preserved and dried fruits and roots were also conspicuous items under this heading, and a collection of both tropical and temperate climate fruits was attractively displayed. An exhibit of the thin-shelled variety of Queensland nut from Mr. J. B. Waldron, near Murwillumbah, was particularly interesting. In the grain division N.S.W., thanks largely to Glen Innes, led all competitors, obtaining 129 points (possible 150), both wheat and maize securing 94 per cent. of the maximum points. The scoring in tropical products was comparatively low, though higher than that of West Moreton—sugar-cane (from the Richmond), coffee, and cotton making useful contributions. In tobacco, this district exhibit gained first place with 18 points out of 20. Hay and chaff were well represented, and in this division, grasses and their seeds, sorghums, and commercial fibres were conspicuous. In minerals and building materials, some interesting specimens from Glen Innes and the Clarence, and coal from Tyalgum were shown. Interest also centred in samples from a deposit of clay and silica from Dunbible, near Murwillumbah, which is being commercialy utilised in combination with casein from the North Coast Butter Factory in the composition of a cold water paint. In wool this District Exhibit gained an aggregate of 102 points out of a possible 110. The trophy of wool formed a striking feature of the court, and the samples—both greasy and scoured—numbered thirty-six in all. For effective arrangement, New South Wales was second only to West Moreton. The prize of £10 offered by the Royal National Association for the best descriptive booklet was won by New South Wales, the writer being Mr. A. E. Overall.

SOUTH COAST.

(797 Points.)

The area included under this heading is comparatively small, but it embraces some of the finest dairying and fruitgrowing country in this State, and lately it has been extended to include the city of South Brisbane, thus adding materially to its manufacturing resources. The entry was made by the Agricultural and Pastoral Society of Southern Queensland. Mr. W. Laughlin was organiser. With factories in its area like those of Kingston and Beaudesert it is not surprising that South Coast scored well for butter; but the absence of cheese spoiled the aggregate in the dairying section. Hams and bacon also showed up well, and the points gained for bread, biscuits, &c., were only one short of the possible. A notable success was achieved in preserved fruits, jams, &c., a splendid collection gaining the maximum of points under that heading. Among fresh fruits was an excellent display of citrus by Mr. F. Shailer. Woodwork was another very fine exhibit, receiving higher points than those gained by any of the other competitors, and only two short of the maximum. Leather and tinwork were also well represented. In tropical products the South Coast was less successful than might have been expected, but among the sugar-cane exhibits was a fine stool of D.1135 composed of no fewer than forty-nine sticks of cane. The high scoring for preserved fruits was no doubt attributable to the remarkably fine trophy of the products of Hargreaves and Sons, Wynnum. This occupied one corner of the display, and was artificially illuminated, thus showing to the best effect the bright colours and clearness of the marmalade, jams, and jellies. Pineapple and other canned goods were fully displayed, and altogether the trophy was one of which any court might well have been proud. Some well grown vegetables were from Sunnybank, Wellington Point, and Beenleigh, whilst the maize exhibits, which were of creditable quality and variety, were from Beenleigh, Loganlea, and Beaudesert. Wheat, though not a staple product of this area, was shown by growers in the Beenleigh and Beaudesert localities. Mr. P. Hortz, who is well known as a

builder of silos of various sizes and patterns, from reinforced concrete, had sent in models and photos of work already done by him, and specimens of ensilage, and was himself in attendance to give any information required. Atkins' Scale Manufacturing Works, South Brisbane, showed scales of various types, including a portable live pig and sheep weighing contrivance. It is evident that the system of selling pigs on their live weight, as tested at the scales, is creating a demand for a contrivance of this kind.

PRIMARY PRODUCTS ONLY.

This division of the District Competitions, corresponding with what was formerly the "B" grade class, attracted this year as many entries as the "A" grade, and the general result was a very fine display of farm, orchard, and dairy products. Following is a brief review of the several courts:—

KILCOY AND DISTRICT—FIRST.

(585½ Points.)

The nominators in this instance were the Kilcoy Pastoral, Agricultural, and Industrial Society, and the principal organiser, Mr. W. E. Reason. The district represented includes that portion of the Brisbane River watershed embraced in the vicinity of the Stanley River, Kilcoy Creek, Sandy and Sheep Station Creeks, and other tributaries. The display was on the whole very effective, and, as was the case last year, it secured highest points for effective arrangement—namely, 71 out of a possible 80. All the districts scored well in the dairy produce section, but Kilcoy was somewhat behind the others in this respect. Foods, and especially pig products, honey, and confectionery, were well represented, and gave this collection an advantage over all the others, hams and bacon securing 43 points out of the possible 50. Fruits and vegetables, again, was a section in which Kilcoy did particularly well, and notably so in preserved fruits, which scored the possible, dried fruits and preserved and dried vegetables being within a single point of the maximum. In both the fresh and preserved classes, bananas were shown of high quality, and there were also some excellent citrus fruits, for which the district is well adapted in favoured portions. English potatoes comprised about sixteen varieties, and the fresh vegetables, chiefly those grown by Mr. A. Pratt, and particularly the cauliflowers, were very fine. In the grain section, full points were secured for meals, and in maize this collection was ahead of the others, with 80 per cent. of the possible. It is recalled that last year so good was the type of maize included in the Kilcoy collection that students from the Gatton College were sent to this court to study the types of maize shown. Wheat is not an ordinary product of this district, but the samples shown were sufficiently good to secure 40 points out of the 50 allotted to this class. Timber, for which some parts of the district are famed, constituted an interesting exhibit, both in the rough and polished state, exhibiting the beautiful grain of some of the varieties. Tropical products were not a strong feature in any of the collections, but some sugarcane of excellent quality grown behind the D'Aguilar Range was included in the collection. Also some excellent samples of cotton were shown. Although not scoring highly in minerals, Kilcoy showed some reef and alluvial gold specimens from the old Jimna diggings, as well as copper from the head of Kilcoy Creek. Hay and chaff were shown in variety and of fair quality, but it was not one of the leading scoring lines. In women's work, Kilcoy secured the maximum of points, as well as in school needlework.

NORTHERN DARLING DOWNS—SECOND.

(862 Points.)

The Dalby Agricultural Society undertook the responsibility of this entry, and the work was in the capable hands of Mr. W. Dinneen, of Jandowae, and of Mr. N. C. Hooper, of Bell, as joint organisers. The contributing centres were mainly Bell, Jandowae, Tara, Chinchilla, and Dalby. Unfortunately, parts of this area had suffered both from rain shortage and a plague of mice. For both butter and cheese

PLATE 78.—WHEAT BREEDING ILLUSTRATED IN THE AGRICULTURAL COURT.

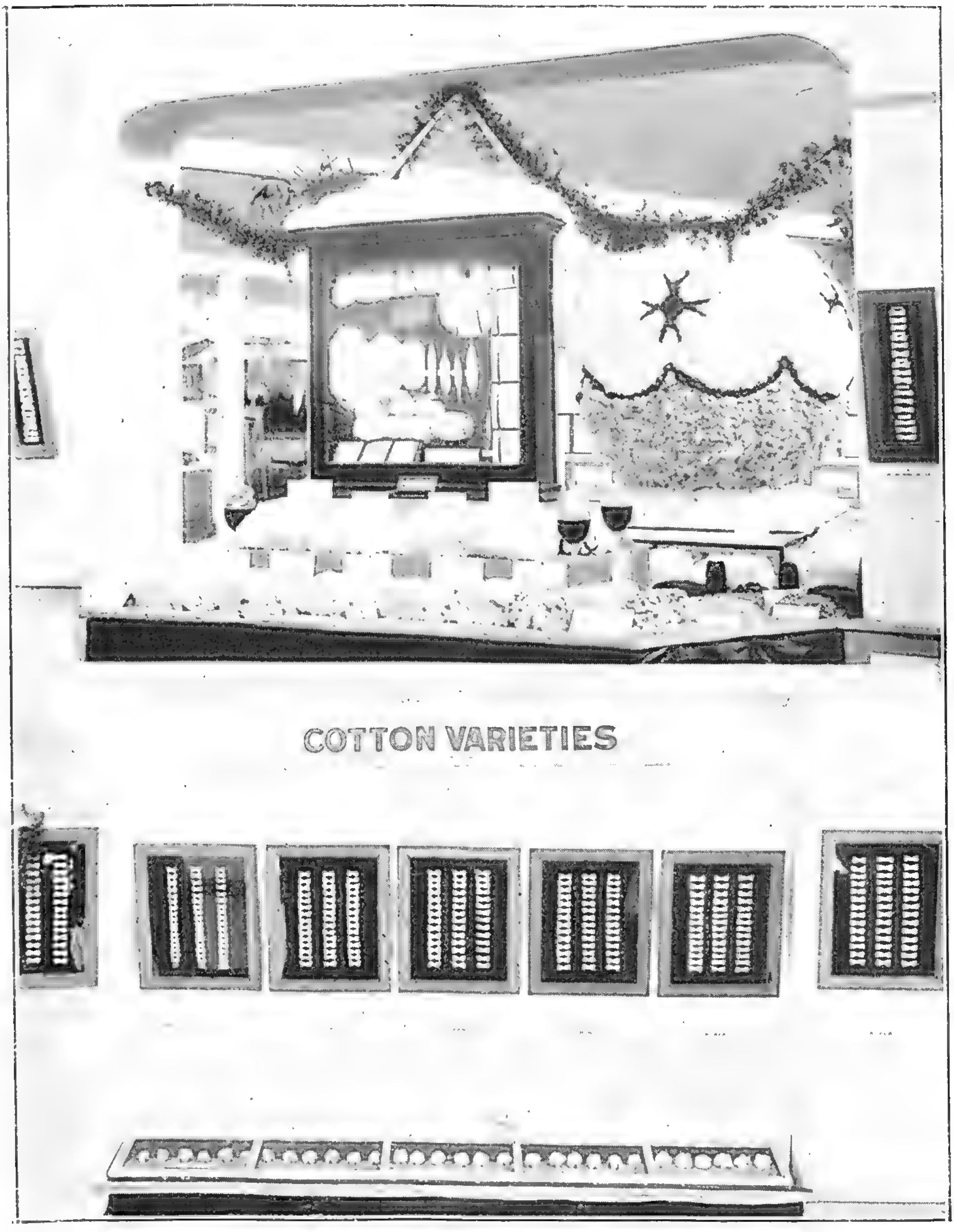


PLATE 79.—INSTRUCTIVE COTTON EXHIBITS—COURT OF AGRICULTURE.

this exhibit scored highly, the principal factories represented being Dalby for butter, and Moola, Cooranga North, Koondai, and Sunnyvale for cheese. In foods also higher points were secured than by any of the other districts, the leading lines being hams and bacon and lard, and there was a creditable exhibit of honey and by-products from the apiary of J. T. Porter, Tara. Confectionery was another strong class, home-made sweets being contributed by Miss Grant (Dalby) and Mrs. Walton (Cooranga North). Fruits, vegetables, &c., did not score so well as in the case of some of the other districts, but some exceedingly fine citrus was shown from the orchards of the Kaimkillenbun and Tara districts; also there were some excellent preserves, including a great variety of fruits. In the aggregate Northern Downs surpassed all others for grain and by-products, repeating in this respect its victory of last year. Both wheat and maize were shown of excellent quality, with nearly a score of varieties in each case, mainly from Bell and Jandowae areas, whilst the Dalby Mill contributed flour of local make. A collection, which included sixty different varieties of grasses, was also notable. A varied collection of timbers (fifty-two descriptions in all), together with wattle bark, gave Northern Downs a lead in this section. In tropical products this district was at a disadvantage, being quite outside the sugar belt; but in cotton it came level with Nanango, and some good samples were shown. Minerals are not a speciality of this part of Queensland; but there were sufficient to show that the district is not without such resources, and a feature of no little interest was the sample of naturally produced salt obtained by Mr. Dinneen from caves in the Burri Burri district. In pipe tobacco some very excellent samples grown by Mr. J. Sargeant enabled the district to score 15 points out of a possible 20. The hay and chaff section was a particularly successful one, as is not surprising from the reputation of the district, and 114 points placed this collection well ahead of all the others in this division. In both hay and chaff the quality was particularly good. Scoured wool gained the full quota of points, and greasy was but a single point below the maximum. Among the chief contributors were C. Routley (Bowenville), M. Jeitz (Jandowae), and J. Haase (Dalby). For enlarged photographs the full scale of points was allowed. Mention should also be made of an excellent exhibit of hides and skins from Jandowae, which secured within a single point of the maximum. The district women and the school children contributed materially to the completeness of the court, though less successful than in some of the others.

NANANGO—THIRD.

(840 Points.)

Nominated by the Nanango Show Society, this district collection was made up of exhibits from farms around Nanango, Broadwater, Yarraman, Blackbutt, Maidenwell, and Tarong. The organiser was Mr. R. H. Robinson. A feature noted in connection with this display was the large number of farms contributing to the various sections. Butter and cheese from the Nanango and Brooklands factories respectively gave assurance of creditable representation in the dairy section. The strongest features otherwise were the cereals and fodder and the minerals (including copper, iron, coal, and quartz and alluvial gold). Citrus fruits, bananas, and pineapples were of a quality to secure higher points than in any other collection, with the single exception of the Kilcoy district. Wool, both greasy and scoured, was also a very strong feature. Hay and chaff in all the leading varieties gained higher points than any other display except Northern Downs, which must be regarded as distinctly creditable. This division included also some excellent broom millet, for which 8 points (out of a possible 10) were scored. Ladies' needlework and knitting, as well as school children's work, compared very favourably with that shown in other courts, and was beaten only by Kilcoy.

KINGAROY.

(810 Points.)

Mr. J. A. Nystrom, under the ægis of the Kingaroy Show Society, organised this exhibit. Though defeated it was by no means disgraced, and as a demonstration of the resources of the district it had much to commend it. In dairy produce it secured second highest points, the chief contributor in butter being the Kingaroy

factory. Maize, as was to have been expected, proved an outstanding feature, including some twenty varieties, and was attractively displayed. Hams and bacon scored well. Honey and by-products were from the apiary of Mr. C. Dossell. For English potatoes Kingaroy stood highest, the principal varieties being Carmens, Guyra Blues, and Brownell's Beauties. Fresh fruits also scored well, the citrus being particularly good. Fresh vegetables also were a creditable feature. Peanuts were shown in bulk, and of both red and white varieties, and these secured points only one short of the maximum. Timbers indigenous to the district were shown in upwards of forty varieties. In hay and chaff a creditable showing was made, and among the exhibits were specimens of hemp and flax fibres grown in the South Burnett district. The women and children also contributed worthily to the interest and value of a very fine collection.

DAIRY CATTLE.

The numbers of cattle were not so large as in previous years, but this was compensated by the quality of the exhibits. For some three years a children's calf class in each breed has been added to the schedule, to encourage the younger generation in the art of rearing and exhibiting an animal.

Ayrshires.

These were a vast improvement on last year's showing, all being well prepared and in good order. Several previous exhibitors were absent. Mr. Geo. L. Wilson, of Berwick, Victoria (judge), expressed pleasure at the splendid quality paraded before him, and specially mentioned having to place last year's champion cow third this time, although well shown. He stated her vessel had "gone to pieces." Jones Holmes's Blanche of Longlands, now awarded the purple ribbon, was a beautiful roomy cow, full of quality; in fact, it was one of the hardest tasks he had for five years to award the champion, she being a very typical animal, with a good vessel and plenty of constitution.

Although the Ayrshire exhibits did very great credit to their respective owners and breeders, and it seems that the latter have risen to the occasion, it may be hoped that with the reappearance of some of the absent breeders, next year's display will eclipse the present one.

Jerseys.

This popular breed always appeals to the artistic eye. Their clean-cut features, silky shining coats, and their domesticity, all tend to gain them admiration and popularity. This year's display did not come up to the standard of past years. Several of the breeders prominent in former years were absent. Some of the animals were disappointing, more especially in the male classes, which seemed to lack size and constitution. This applies also to the females. Three new exhibitors were Messrs. Chas. Kretchmer, of Chatsworth, Gympie; J. G. Summers, Sefton Stud, Kilkivan; and G. A. Ferguson, Chelsford Stud, Woodhill, who fully justified their appearance by the splendid manner in which the animals were shown and the quality of their exhibits.

Illawarra Milking Shorthorns.

The showing in this breed eclipsed all previous years. The type throughout was very even, although in one or two instances a slight variation was noticeable. The judge, Mr. J. J. Hayter, of Byron Bay, had a very strenuous task. He was more than pleased with the exhibits, and specially mentioned B. O'Connor's champion bull, Brilliant of Oakvale, and E. M. Franklin's champion cow, Peggy 2nd of Fairfield, both true to type and showing great milking qualities. The reds seemed to predominate, but a fine class of roans in the Sires' Progeny Group, owned by A. J. Caswell, called forth much applause when awarded the blue ribbon. This breed had the largest number of ringsiders, who did not forget to applaud any meritorious wins, which, of course, was a great incentive to the judge.

PLATE 80.—HOW QUEENSLAND FARMERS ARE SERVED BY SCIENCE—ECONOMIC ENTOMOLOGY ILLUSTRATED IN THE AGRICULTURAL COURT.

1

2

Plate 81.

1. Object lessons from the Bacteriological Laboratory, Stock Experiment Station at Yeerongpilly.

2. Poultry Instructor's work illustrated in the Court of Agriculture.

Guernseys.

Dairymen have not yet fully realised the good qualities of these yellow and white cattle. They possess to a great extent the high-testing qualities of the Jerseys. They give a fine flow of milk, and have also the constitution, and it behoves the fanciers to boost their breed like the supporters of other breeds. They have the animal, and with a systematic advertising scheme many dairymen could be induced to enter into the breeding of the Guernsey. Last year competition was keen among the three breeders, but this year it is to be regretted that splendid team of Mr. A. Cooke, of Maleny, did not have an opportunity of showing its superiority, there being no competition. However, what were shown were of outstanding quality, and the judge (Mr. E. Burton, of Hermitage) was well pleased with them. Mr. Cooke is commended for the manner in which he showed his animals, and he secured the award in all classes except heifer under 3 years, in milk, and bull 2 years and under 3, for which no entry was received. The champion badge for bull was awarded to Milton's Itchen Prince III., a fine type of animal bred by A. Hordern, Sydney, and reserve champion was awarded to Victor of Wollongbar. The champion badge for cow went to a fine roomy animal showing a splendid vessel and vein, with a fine characteristic head—Minnamurra Cherubine, bred by Kinross Bros., Inverell, who also bred the reserve champion, Minnamurra Olga.

Friesians.

This section showed a marked reduction in numbers compared with previous years, and many previous exhibitors did not put in an appearance. It is pleasing to note the success of one of the first-time exhibitors, J. A. Jensen, of Wondai, whilst A. McAlister, of Forest Hill, also gained some ribbons.

The judge, Mr. F. H. Butterfield, was very pleased with the exhibits. Several, he said, were fit to win anywhere, and compared very well with the Southern cattle. The several animals were well shown, and the champion cow, Brown Bros.' Mooroombin Pontiac Girl, was a very typical cow, wonderfully well balanced, with a splendid udder. It was freely remarked during the judging that the judge could pick out the producers, and his awards were eagerly watched by the small number of keenly interested ringside enthusiasts.

HORSES.

There were five competitors for the thoroughbred blue ribbon, including Mr. Yore's Polybius, with his record of three previous wins—1921, 1923, and 1924. He suffered defeat on this occasion, the championship being awarded to Mr. J. H. S. Barnes's Rivoli (by Repartee from Lady Babbie), a beautiful dappled bay and an A.J.C. winner, besides having run second in the Melbourne Cup race, and with otherwise a fine racing record. Mr. E. Steele's Midnight Frolic (imp.), which has raced in Brisbane, was placed second. Concerning Polybius, the judge, Mr. Fanning, of Townsville, remarked that he would have won for remount sires had he been entered in that class. As it was, Midnight Frolic secured the prize. The championship for thoroughbred mares went to Mr. I. J. Moore's Golden Opinion, with Mr. E. G. Blume's Flying Malka second and reserve champion.

Mr. James Sprott, of Winthrop, Talgai West, judged the Clydesdales, and expressed himself as well pleased, especially with the 3 and 2 year olds. W. Frood's British Hope, which was Queensland champion in 1917, was again successful, and he was also winner in the class for sire and two of his progeny. A. Langmore's Carlyle Crystal, bred by the Jondaryan Estates Company, came second, and Mrs. G. N. Watson's Crystal Blaze was third. Mr. Frood was also successful in the 4-year-old class, with W. A Schmike's St. George (bred by Mr. G. Weir, Laidley) second. No fewer than 11 colts came out for the 3-year-old class, and Gavin Elliot's Prospector colt Professor was placed in the lead, winning also the championship for heavy draughts, with British Hope as reserve. A. T. Creswick's Marshal Allenby was second, described as a remarkably fine colt, and bred by the exhibitor at St. Helens, Pittsworth. The Queensland College colt Prosfield was third. For 2-year-olds, Mr. Creswick's entries filled all three places out of a field of nine, all being sired by his stallion, Captain Dale.

Entries in the Clydesdale mare classes were less numerous, but some excellent animals were shown, the winners being those entered by Gavin Elliot, Macfarlane Bros., A. T. Creswick, and W. Frood. The championship for draught mare was won by Mr. G. Elliot, with Lady Meta, winner in the brood mare class, the reserve going to Creswick's Beryl.

The Queensland Agricultural College made a fine non-competitive display with four of the State-owned Clydesdale stallions.

In stud ponies there was a good showing, and Mr. J. A. Rudd's Hafrod Sensation, last year's champion, was again champion Welsh pony stallion, reserve in class pony stallion in harness, first in stallion not exceeding 14 hands (any age), to be driven, and also in the led class for same. The champion pony stallion in harness was Mr. J. Young's Ivanhoe II., winner both in the 12 and 13 hands classes. The champion pony mare was Miss A. Mullen's Gold Top.

The champion trotting stallion was Mr. W. H. Smith's Sparkling Jewel, with Mr. J. Dowridge's King Bells reserve. Trotting mare championship, Mr. A. A. Prior's Cole Bells; reserve, Mr. T. Garrard's Miss Brisbane.

On the opening day a record-breaking effort was successfully made by Mr. J. B. Sheehan's Machine Brick, a bay stallion by Rock Huon out of Gert, for the £400 offered for stud book stallions trotting 1 mile in harness and lowering the record established by Globe Derby, of 2 min. 12¾ sec., in 1922. The course was completed in 2 min. 12 sec.

For the prize of £50 for stud book mares trotting 1 mile in harness and lowering the record of Golden Wilkes in 1923 (2 min. 21 sec.) three entries were received. Mr. M. J. Kenny's Highwood Lass broke once but completed the course in 2 min. 20½ sec., thus breaking the record by ½ sec.

Among the chief events of the Opening Day was the Pony High Jump, for which there were seven entries. The prize was £30, with an additional £25 for any pony breaking the Brisbane record of 6 ft. 10 in., established in 1923. Mr. C. Russell's ten-year-old grey gelding succeeded in topping 6 ft. 11 in., thus establishing a new record.

The Royal National High Jump, one of the chief ring events, proved a highly interesting contest. Mr. L. Judd's Thumbs Up and Mr. J. M. Webster's Hailstorm both cleared 7 ft. 6 in., thus creating a new Queensland record. These owners accordingly divided the extra £100 offered in the event of the record being broken. The Australian record is still held by Mr. W. J. Weir, of Wangaratta, N.S.W., whose horse Musician cleared 7 ft. 10 in. in 1921.

SHEEP.

The sheep exhibits were disappointing and not at all representative of the State's greatest rural industry. The fact that shearing was in full operation on most of the stations was responsible, no doubt, for the paucity of entries in this class. Mr. J. H. Fairfax, Marinya, sent in two Corriedale rams and two ewes, and Mr. S. E. Pullen, of Prairie Plain, showed three Lincoln ewes, two Shropshire rams and three ewes, and three Southdown rams and three ewes. There were, unfortunately, no entries in the twenty-eight merino classes scheduled.

The Corriedales were fine specimens of the breed, one of the rams especially being the ideal of what a Corriedale ought to be—straight and broad in the back, well ribbed up and evenly woolled, big and symmetrical—and his fellow was almost as good. The ewes, too, filled the eye effectively. The Corriedale is a cross obtained by mating Merino rams with Lincoln or Leicester ewes, and is an excellent dual-purpose farmers' sheep, early maturing, hardy, and carrying a heavy fleece of Merino type. They are regarded as very suitable for small graziers near the coast.

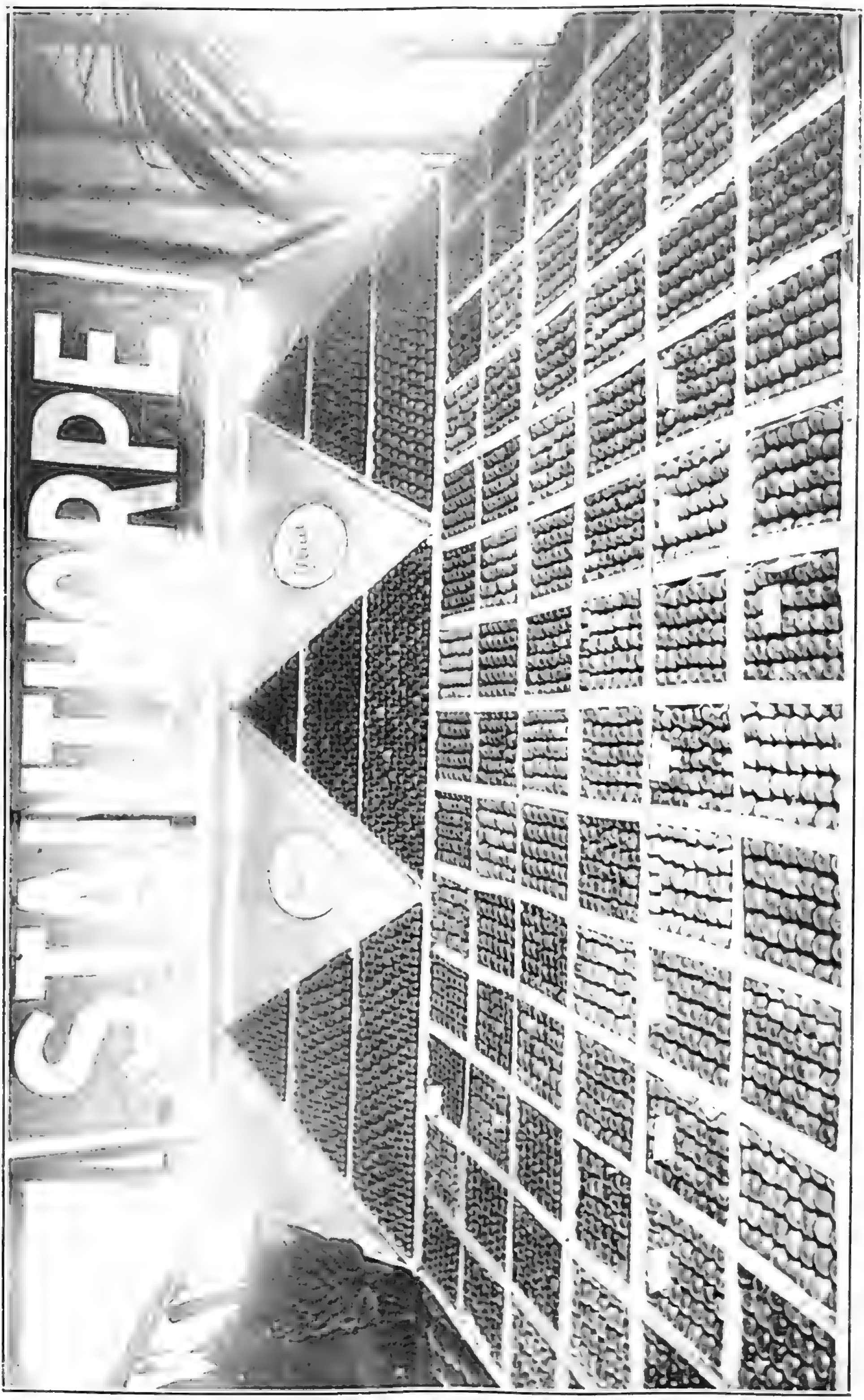


Plate 82.—Apples from Stanthorpe.

Plate 83.—Results of the Work of the Department in evolving Wilt-resistant Tomatoes were well illustrated in the Bowen Exhibit.

The Shropshires were good specimens of this attractive breed of mutton sheep, and the Southdowns were excellent examples of this prolific, early-maturing breed. They were well-shaped, and the fleece, though light, was of fine quality. It was specially disappointing to find that Dorset Horns were conspicuous by their absence. This breed deserves much greater attention than it has so far received from those who combine sheep rearing with farming in the coastal districts. No breed will pay better as early lambing sheep, and no lambs mature so early as Dorset Horn crosses, for at three months they are ready for freezing, and are eagerly sought after by butchers. There were no representatives of Border Leicesters or English Leicesters, and the Romney Marsh class attracted no entries. It is to be hoped that at future shows British breeds may be more worthily represented. A good show of these would be a valuable object-lesson to mixed farmers whose holdings are close enough to seaports to allow them to send in lambs for export cheaply and expeditiously.

SILVICULTURE IN OPERATION—JUNGLE TREASURIES.

Through a wicket gate in a white picket fence, beneath the gold-lettered sign of the Queensland Forest Service, the investigating crowds passed along the paths of a forest nursery in the beds of which the seeds and seedlings of future forests were beginning the tree careers which will end for them beyond the sawmills, in all shapes which go to make up the homes of the people of the State.

White picket fences, seedbeds and seedlings, the refreshing greenery of palms and ferns, a black and white gallery of photographs depicting the activities of forestry; and beyond this cool foreground were the contrasting depths in reds and browns of the precious wares in woods which come from the jungle treasuries of Queensland, and give to the forester proper pride in the rich possessions of which he is trustee.

This was the Forestry Court in 1925.

The Story of the Seedling.

In one corner of the little nursery a sign announced "The seed of the hoop pine tree germinating." Visibly green manifestations exhibited themselves upon the soil surface, plumules of *Araucaria Cunninghamii*, unfolding and carrying up on their heads as caps the brown-winged seed vessels in which these future giants of the forests were cradled from the tree tops to the ground. Silval infants, six months the senior of the new fallen seeds, bravely flaunted their green twigs in the beds alongside, and dressing by the right and left in rows stood the still more venerable youngsters destined soon for the plantations which are to become their life-long habitations. "In long trousers—ready for the plantation," said the card beside them, and the long trousers were visible as a tin to encase the tender taproots in a swathing of soft soil, a tubular sheath or cartridge in which the hoop pine treeling leaves the nursery to enter the hard world beyond.

There are at present a million such seedlings in the forest nurseries of the State and each seedling must be attired to its comfort. For unlike the forest babies of the old world, the Queensland treeling grows long taproots so that he may dig in early against the winter droughts, nor depend upon the torrents of summer rains which the torrid sun immediately draws from the surface of the soil. Wise in its day and generation, the Queensland treeling provides for early establishment in a safe and permanent job, and refuses to develop those bunchy fibrous roots which delight the heart of the tree transplanted in European wilds. Since the Queensland tree refuses to accommodate the forester, however, the Queensland forester seeks to accommodate the tree, and accordingly envelops its legs in a 6-inch tube, in which it is transported to the planting side and there released by a pressure of the tube latch which unloads it into the planting hole totally unaware of any abnormal disturbance of its domestic economy. Whereupon it continues to grow in perfect peace and satisfaction, save for a little sunburning. In five years' time in the plantation it will have

reached a greater stature than those denizens of the silvicultural slums which were exhibited beside it for contrast with a placard to announce that their dwarfed and stunted state at the mature age of thirty years was due to their long suppression under the canopy of their grandfather trees, those grandfathers which are yielding their sawdust at the mills to-day to furnish homes for us all.

In a small annexe the making of these tin twists and the placing of the treelings therein were demonstrated.

A Commercial Concern.

The Queensland Forest Service is inclined to be commercial in character. One of its aspirations is to grow two crops at once where only one grew before. In certain moist nooks of the Mary Valley State Forests, experts (and others) declare that very large bananas may be produced to perfection if only the Forest Service would release the land for selection. But bananas have a profitable life of only seven years, after which lantana is often regarded as a rejuvenating succession in the rotation of crops. The Queensland Forest Service spends a certain sum of money annually in lantana eradication from its forests, and has an aversion for lantana accordingly, and it suggests that timber might be preferable upon its forests in lieu of lantana. From India it has derived the Taungya system of silviculture, which consists of combining field crops and tree farming for so long as the field crops may survive the competition of their greater vegetable relatives. Under Taungya, in the Mary Valley Forests, bananas are now being grown experimentally as a seven-year crop, and under the bananas in the second or third year are being planted the beech and maple trees, which at the seventh year will succeed the declining banana investment, and whilst producing timber for the future at the same time will replenish the jungle soil for the future rotation of banana crops at the time when private holdings are exhausted of that pristine and virginal vigour which bananas as an economic crop demand for their development. In a corner of the forest nursery at the Exhibition were seen young pine treelings patiently anticipating in the shadows of the banana suckers their succession to the forest inheritance of which the foreign fruit has despoiled them temporarily for the space of seven years.

A Great Industry.

Upon the walls of the court beside the nursery were arranged photograph upon photograph of forests and forest operations, from that of the forest surveyor who finds and classifies and lays out in logging area and compartment the future State forests, to that of the forest roadmaker, who fells a 4-chain belt of jungle to make and open to the sunshine a logging road with sides clothed with Rhodes grass to provide forage for the logging teams that work upon it. The many and diverse methods of harvesting the timber crop with bullocks and horses, steam tractors, motor trucks, and caterpillars, the sawmills and timberyards, the types of bush and scrub and jungle, which go to make up the timber lands of Queensland, the nurseries and plantations, the natural regeneration operations, and all the other things which build up the composite activity which is known to us as the Queensland Forestry Department, were graphically illustrated.

Our Wealth in Wood.

Beyond these green beginnings of the forest and beyond these black and white representations of the things that are being done in forestry in Queensland, there arose in the centre of the Forestry Court four panelled corners of four quaintly furnished rooms illustrative of the results which may be achieved in native wood in ply cabinets, floorings, and furniture of local production and local manufacture. Here was a waxened hardwood floor, cedar-coloured and ring-sheened, fit for any drawing-room parade, a floor of red satinay, 60,000,000 superficial feet of which are standing in trees upon Fraser Island awaiting a market. Upon this floor, blood-red and brilliantly polished, a suite of furniture of the same handsome wood invited the admiration of the populace. Next door a polished floor of spotted gum, another of rose mahogany, deep red and carpet-like, and still another of rose walnut, unknown as yet to the cabinet and carpenter connoisseurs of Brisbane. And each was divided

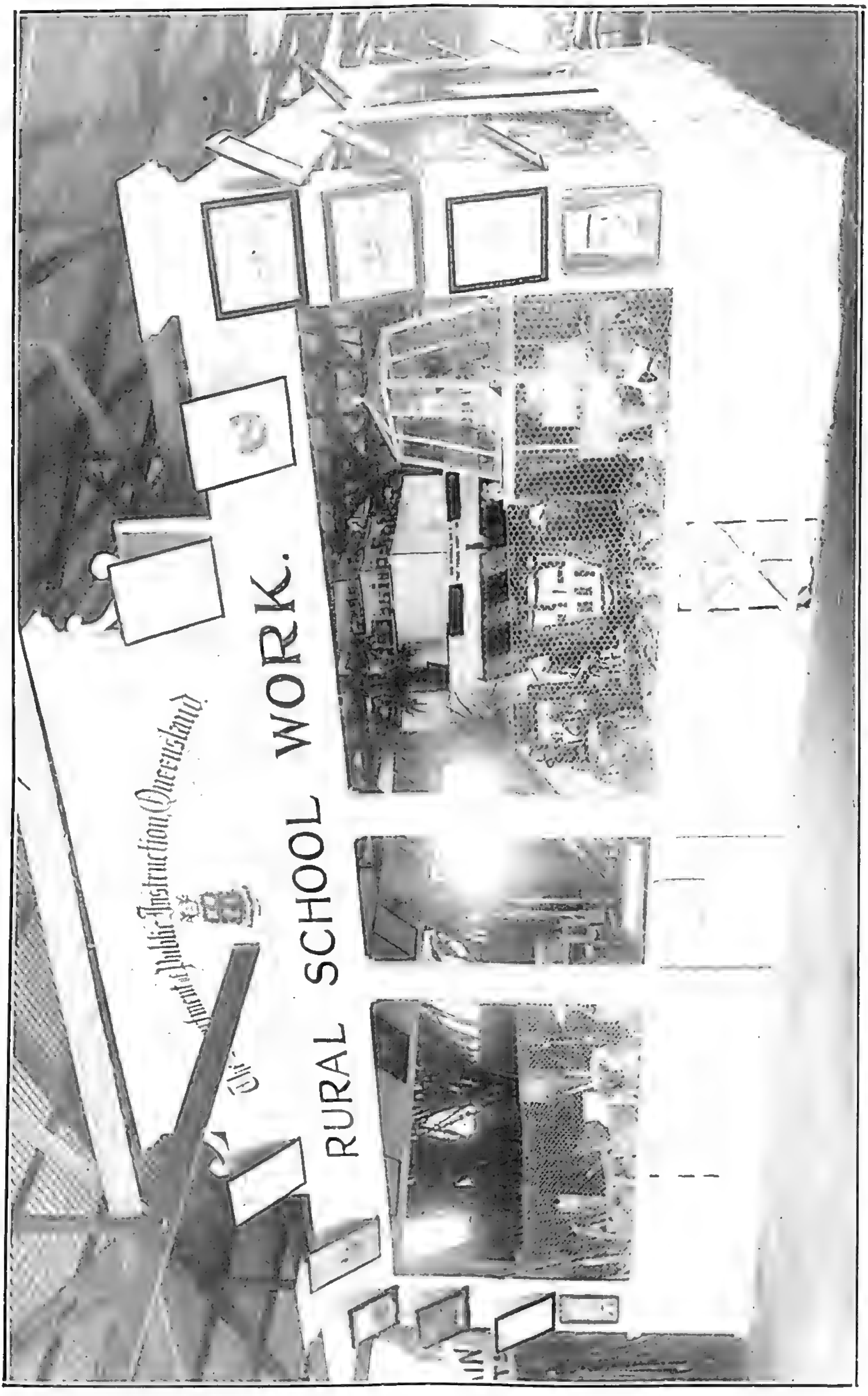


PLATE 81.—TRAINING IN HANDICRAFTS—RURAL SCHOLARS' DISPLAY.

Plate 85.—An Instructional Exhibit for Pig Raisers.

from each by panelled walls, of figured ply of Medang walnut, silky oak, hoop pine, and maple, each wall of single ply, yet on either face a different timber, so that, with the grooved framing in which they fitted one might have a stout partitioning of silky oak and Medang walnut between rooms, though the partition be but a single sheet of wood. With such material may our future homes be artistically and suitably lined, at costs less than that of the rude, unpainted boards with which our present uncritical generation is so extraordinarily content. The Forest Service is featuring this presentation of home partitioning, of which several modern cottage builders in Brisbane already have taken advantage.

Our Cabinet Timber.

A grey satinash bureau from the Eungella Forest at Mackay, a Rose satinash smoker's cabinet and table, a red siris music cabinet, and a Medang walnut phonograph cabinet are some of the novel contents in timber of these home nooks built from the less known cabinet woods of Queensland.

In a handsome room at the rear of the court, under the coloured beams of an Aladdin lamp, stood a noble dining-room suite in rich red rose mahogany from the Killarney State Forest. This suite was set in a background of gorgeously figured medang walnut plywood panels, red-tinged to conform to the cardinal colour scheme of the room, and overhung by a radiantly-figured frieze of satin-like hoop pine ply. The room was a splendid example of the artistry which our magnificent native timbers inspires in the minds of capable craftsmen.

A 16-foot racing skiff rested high and dry in the final corner of this court of wood and trees, gleaming in its new polish, and proudly aware of itself as a pure blooded, 100 per cent. "dinkum" Queensland creation, made from a few of the trees which grow therein, trees of which in the Universal wood index of the department standing close by there were listed 400 or 500 different sorts in the State. These range from the snow-white hazelwood and aspen of Eungella to the coal-black ebony of the Gulf country, the ivorywood of Imbil, the cedar-like figwood, the cork-like kurrajong, the black ironbox of Mackay, to the red cocobolo of Cooktown, the wood which adorns the handles of the butchers' knives, and which yet may find recreational use upon the bowling greens as a substitute for imported lignum vitæ.

On a finger-thick slat of saffronheart from Atherton, placed in demonstration between two low pedestals, the 9-stone attendant might be persuaded to modestly try his weight in demonstration of the fact that with such a native production a hundredweight of jewfish may be played skilfully by the angler. Or a violin of Coondoo from Cooroy might yield musical tones equal to those of the chosen woods of Europe. Or in a glass cabinet might be descried inlay work in wood in the form of jewel cases, cricket stumps of silver ash, billiard cues of ivorywood and ebony. T squares of blush coondoo, and baseball clubs of waddywood might elsewhere be seen.

In Queensland there are obviously woods rich and beyond compare, and he who sought the forestry court at this year's Exhibition was deeply impressed by the plenitude of the display, and left convinced that efforts are afoot which will ensure to the Queensland of the future an abundance of the material which, in the end, must create for this State a woodworking industry equal in craftmanship and beauty of production to anything which the modern world may anywhere present.

FORTHCOMING SHOWS.

Sept. 2–3 —Esk Bushmen's Carnival.
4–5 —Wynnum.
12—Zillmere
16–17—Imbil.
19—Stephens.
23–24—Gympie.
24–25—Beenleigh.
26—Maroochydore.

Sept. 26—Rocklea
Oct. 1 —Kenilworth.
2–3 —Toombul.
9 —Southport.
10—Enoggera.
16—Nerang.
17—Balmoral.
Nov. 25–26—Pomona.

General Notes.

Queensland Co-operative Bacon Company.

Mr. J. A. Heading, D.C.M., M.M., of Murgon, has been elected chairman of the Queensland Co-operative Bacon Company, Limited, Murarrie. Mr. Heading has been chairman of the Murgon Show Society, and for four years chairman of the Murgon Shire Council. He served with distinction overseas with the A.I.F.

Main Roads Board.

Executive approval has been given to a number of permanent improvements to main roads. These are as follow:—Goomeri-Childers road (Degilbo Shire), estimated cost, £1,488; Goomeri-Gayndah road (Gayndah Shire), £5,060; Gayndah-Binjour-Mundubbera road (Gayndah Shire), £1,359; Murgon-Boat Mountain road (Murgon Shire), £832; Maryborough-Pialba road (Burrum Shire), £3,493; Bundaberg-Gin Gin road (Gooburrum Shire), £5,037; Palmwoods-Montville road (Maroochy Shire), £568; Cairns-Tableland road (Eacham Shire), £9,473; Kingaroy-South Burrandowan road (Kingaroy Shire), £2,757. The latter is a developmental road.

Water for Pigs.

A very important factor in the well-being of pigs is the presence of a supply of good fresh water. And even though the rations of food served out to them may consist to a great extent of sloppy food, a drink of fresh water is relished occasionally and in some circumstances frequently. Pure water does not contribute, as believed by some, too largely to the accumulation of lean where the fattening pig is concerned; as a matter of fact, that pig which when fattening will rise from its bed between meals and partake of a copious draught of water, afterwards returning to its bed to resume its slumbers, is putting the good stuff inside it to the best possible use. Pure water is far the best lubricant for the internal organs when all that is needed is a thirst-quencher. Swill, ad lib., is often the order of the day and night for all that; but there are times when the stomach of the pig wants a cooling wash-out preparatory to a sound substantial meal.

It is always found that there is more contentment and progression doing amongst pigs when a good square meal is supplemented only by pure water in a clean trough that has not been permitted to foster an accumulation of green slime inside, as a result of the retention of stagnant water. Empty the troughs every day, and give the inside of the troughs a good rub round. If the circumstances warrant a meal of swill, let it be a meal, not the continuous supplement to a meal. The absence of food periodically tends to the stimulating of a healthy appetite, but food ever present spoils a healthy appetite, and not infrequently initiates the formation of an abnormal one.

The Udder.

Always prefer the cow that has a large udder carried well forward without hanging in four prominent pouches, and that is covered with fine silky skin and characterised by four sufficiently large and long teats properly placed to balance the udder nicely. Extra large teats and those that are close together are objectionable, while the presence of several additional or supernumerary teats also is objectionable. The udder should be of normal colour, and one quarter should correspond with its mate in shape, size, and colour. Beware of the udder that is dark red or has a purplish hue in part or whole, or that shows one quarter or more greatly enlarged. Be also much afraid of the udder that is "hard as stone and cold." That is a combination that generally spells tuberculosis, and so does the presence of a hard, large mass high up at the back of the udder.

But do not be satisfied with a visual examination of the udder. Sit down and handle every part of it carefully, for hardened masses mean that garget has been present, that milking abilities have been injured, that other attacks may be expected, or that a quarter has been lost through disease. Strip away some milk from each teat in turn. Look at the milk, smell it, taste it, and so make sure that it is normally rich in butter-fat, correct in consistency, and free from all evidence of disease. It would also be well to see the cow milked clean, if possible, and the milk weighed, and to have a butter-fat test made.—"N.U. Farmer and Stockman."

Chamber of Agricultural Societies.

The annual meeting of the Chamber of Agricultural Societies was held at Brisbane in show week, Mr. John Macdonald presiding. The annual report showed a credit balance of £322, in addition to a war loan bond for the sum of £100. The membership of the Chamber now totalled ninety-seven. Mr. J. K. Murray, Principal of the Queensland Agricultural College and High School at Gatton, delivered an address on the work of the College, and urged all delegates to take a keener interest in the work of that institution. The following were elected:—President, Mr. John Macdonald; vice-presidents, Messrs. Ernest Baynes and G. H. Pritchard; hon. treasurer, W. J. Affleck; hon. solicitor, G. Waugh; hon. auditor, Donald Gunn; executive committee, Messrs. R. P. Watson, E. J. Westaway, and E. C. McConnel; hon. secretary, J. Bain. An honorarium of £75 was granted to the secretary and his staff.

The Fruit Industry.

Mr. E. Duffy, with headquarters at Nambour, is now engaged in instructional work in connection with banana cultivation and the combat and control of pests affecting that fruit. The practicability of controlling the weevil borer is being tested on Mr. A. Martin's plantation at Perwillowen, where trials with the fumigants para-dichlor., calcium cyanide, and chlorocide, and also with plain traps and traps poisoned with Paris green and arsenate of lead are being made. The method adopted is to select various rows, for some of which new plants have been taken, and in others the suckers have been allowed to succeed the parent tree. Where new plants have been used holes are dug around, and the fumigants placed therein, with a separate row for each chemical. The object is to observe if the gases generated in the ground from these fumigants will kill the larvæ of the weevil. Traps are not used around these plants, but, as a check on results, adjacent rows are surrounded with both poisoned and non-poisoned traps. If the plants treated with the fumigants on reaching bearing stage are free from the presence of the weevil or borer, valuable aid will be obtained to freeing banana growers from a harassing pest. It will be some months before investigations on that point can be concluded. During the winter months the weevils are more or less in a dormant state, so at present it is impossible to state whether the poisoned traps have been successful. It was noticed, however, that after Mr. Duffy had collected borers from each of the rows that more dead were counted from the poisoned traps than those laid near the plants without poison.

Mr. Duffy has asked that an appeal be made to farmers to take strong action and to systematically lay traps during the spring months, when the beetle is more active. When chipping is in progress the soil is disturbed around the banana plants, and with enticing traps there is the surety of large catches of the weevils.

Leaf fungus has been attacking banana plants this season. This does not affect the matured fruit, but where the leaves of young trees have become attacked the trunk decays before the fruit reaches maturity, or else the leaves become shrunken, and owing to the lack of sustenance from the air or earth, and no proper protection for the bunch, only small portions of the fruit are marketable.

Citrus trees show evidence of less resistance to disease, and generally failure to produce a high quality of clean fruit. With the view of demonstrating what could be done by scientific treatment, arrangements have been made with Mr. J. Tennant, of Mapleton, and Mr. C. E. Cooper, of Palmwoods, for experimental plots to be conducted in their respective orchards. The former will be in volcanic soil, and the latter in alluvial land. Fertilisers will be applied according to the nature and requirements of the soils. Mr. R. L. Prest, who is supervising citrus culture generally, will superintend the tests in each place. The trees have been given a severe heading back, and the ground treated with lime. It is also intended to loosen the earth around each tree by the use of explosives, and then to apply various fertilisers.

Pineapples, which enter largely into the fruit production of the North Coast, have been subject for some years to a wilting of foliage, and a generally unsatisfactory condition in many places favourable for their cultivation. Nematodes were suspected of being associated with the trouble. Recent investigations by the senior field officer point unmistakably to the fact that nematodes are mainly responsible. Being a most serious pest, with the reputation of immunity from economic treatment, a further field for experiment is opened.

In order that more attention may be given to the general maintaining of orchards in a clean condition, and the elimination of such as are neglected or deserted—which only serve as a breeding ground for pests—Inspector S. G. Williams will be stationed at Nambour, and work from Elimbah to Cooran, and Mr. S. J. Stephens will take up duty from Cooran to Isis Junction, with headquarters at Gympie.

Cotton Growing in Papua.

Messrs. G. Evans, M.A., C.I.E. (Director of Cotton Culture), and E. Ballard, B.A., F.E.S. (Commonwealth Cotton Entomologist), have left Brisbane for Papua and the Mandated Territory of New Guinea to investigate the possibilities of cotton growing in those countries on behalf of the Commonwealth. They expect to return early in October.

Queensland Students Abroad.

Interesting letters containing graphic pen pictures of their travels and pithy notes on their work have been received by their former laboratory colleagues of the Agricultural Chemistry Branch from Messrs. H. W. Kerr and A. F. Bell, the holders of the travelling scholarships awarded by the Government in connection with the work of the Bureau of Sugar Experiment Stations. Mr. Kerr is now at Wisconsin University, and Mr. Bell has entered on a course at Berkley University, California. Mr. Kerr spent some time in Java and then went on to the Philippines, travelling by way of Singapore and Hong Kong. Thence he went to the Hawaiian Islands, calling at Shanghai and some of the seaports of Japan, including Yokohama and Kobe. His descriptions of the customs of the several countries through which he travelled and observations generally make up a vivid and entertaining narrative. In California Mr. Kerr met Mr. Bell and together they went down through Louisiana and Florida and on to Cuba in fulfilment of the objects of each scholarship. The bright and fresh impressions of these two keen Queensland students make up a very readable record.

Co-operative Egg Selling.

In the course of an article on the above subject, the Melbourne "Leader" points out that Australia is now producing £9,000,000 worth of poultry products annually, and although the exports of eggs from Australia to the London markets have increased from 8,000 dozen eight years ago to 1,500,000 dozen last year, there is still a demand for more, and there is still a surplus here to dispose of.

To get rid of our surplus to the best possible advantage, we must employ the most efficient of salesmen, and organise in such a manner that the goods we offer can compare favourably with the many rivals that are out to capture the overseas market.

The average weight of eggs sent from Denmark to London is 27 oz. to the dozen, at once an indication of the righ standard set up as regards quality. Australia has fallen well below that standard, and a warning note was struck some years ago by experienced poultry farmers when it was seen that the size of the eggs produced was becoming less because of forcing to bring about quantity, and the neglect of breeding only from stock that laid eggs of 2 oz. and over.

Another lesson can be learned from Denmark and Canada. Both countries have shown us the importance of co-operation and loyalty. In New Zealand they have found the man to handle the surplus egg in Mr. J. B. Merrett. What New Zealand has done surely Australia can accomplish. Undoubtedly one of the secrets of the success of the Danes in the egg export business has been that they employ the best men at a good salary, making it worth while for them to put their best into the work. To pay inadequate salaries has long been recognised as an economic blunder.

It is no use sitting back and expecting the Government to assume responsibilities. Producers must co-operate and help themselves to gain results. Buyers must be found when the output increases. It is only when eggs are scarce that buyers will seek for them. If it is impossible to sell all the surplus, then efficient preservation must be organised to avoid loss and waste.

Combined action on the part of the producer is, of course, the biggest factor in achieving a successful export trade, or one that will dispose of the produce in the most profitable market. In Australia, in spite of egg pools and other schemes, it would seem that no system has yet been quite successful. This is because there is a lack of loyalty amongst producers themselves. Unless all co-operate and combine the individual must lose. In Denmark, producers bind themselves to sell all their supplies to the local depôts of the society controlling the trade. If they are discovered selling elsewhere they are expelled, and lose the bulk of their trade. In Western Canada, the controlling society imposes a fine of 7 cents ($3\frac{1}{2}$d.) per dozen for all eggs, except those used in the household, which are sold except through the legitimate channels. If Australian producers could combine, co-operate, and enforce loyalty, surplus eggs could be disposed of with as much benefit to poultry farmers as is the case in New Zealand and other producing countries.

Dairying in the Mackay District.

At a recent representative meeting of farmers, held at Mackay, it was decided to form a co-operative dairying association for the district, under the title of the South Kennedy Dairying and Pig Raising Association, and to be run on purely co-operative lines. It was stated that the movement is not in any way antagonistic to the sugar industry, but it is thought that the two can be linked together with benefit alike to the farmers and to the district generally. The Minister for Agriculture (Hon. W. Forgan Smith) is being asked to send the principal dairy instructor to address the farmers on the subject. Steps are being taken to ascertain the number and quality of the dairy stock in the surrounding districts, and it is considered that the Eungella Tableland will constitute an ideal basis for the supply of dairy stock. It is thought also that the feeding of stock will form a profitable revenue for the disposal of molasses. It was agreed to approach the Government to ascertain what concessions would be granted in reduction of freight on stock brought into the district to start the industry. Money was freely offered at the meeting to defray initial expenses, and it was decided that these sums should be credited to the subscribers as a portion of subscription for shares when the time shall arrive.

Disease in Manning River Bananas.

Dr. R. J. Noble, principal assistant biologist for the New South Wales Department of Agriculture, has investigated a disease which has almost wiped out plantain bananas on the Manning River. During the past couple of years whole clumps have been attacked and destroyed, leaving a most offensive smell after the plants rotted down. In a report to the Dumaresq Island branch of the Agricultural Bureau, Dr. Noble says that two species of fusarium fungus and one of bacterium were found. As the disease progresses other organisms appear, and are responsible for the final decay and associated odours. The organism suspected as the cause of the trouble is not comparable to any of the types known to be parasites on bananas in other parts of the world. Present evidence indicates that one species of fusarium fungus is most probably the primary cause of the disease. It is able to enter the plant at any point, although most commonly through the root system. Control measures are not readily applied, since this organism is also able to live on plant refuse in or on soil.

To minimise losses Dr. Noble recommends the destruction of all diseased plants as soon as possible after cutting them out, the disinfection of the axes used before using them on healthy plants, and the selection of resistant stock in affected areas for use in propagation.

Dr. Noble adds that this type of disease may necessitate the abandonment of the diseased areas for long periods up to ten years, but he does not anticipate it will be so bad as that on the Manning. He asks local growers to furnish him with the result of observations on the condition of the disease during the approaching summer.

Staff Changes and Appointments.

Mr. G. D. Daly has been appointed Assistant Bacteriologist, Stock Diseases Experiment Station, Yeerongpilly, as from the 1st July, 1925.

Mr. A. P. Gibson has been appointed Field Assistant, on probation, Bureau of Sugar Experiment Stations, with headquarters at Cairns.

Mr. C. F. McGrath, Dairy Instructor, has been appointed Acting Supervisor of Dairying, Department of Agriculture and Stock, as from 1st September, 1925, to 31st March, 1926.

Mr. T. R. E. Mitchell has been appointed Manager of the State Nursery at Bribie Island.

Acting Sergeant Hugh Tighe and Constables H. W. Horn and C. Harman, of Rosewood, Marlborough, and Calliope respectively, have been appointed Inspectors of Slaughter-houses.

Mr. T. Unwin, Inspector, Diseases in Plants, at Cairns, has been also appointed Inspector of Stock.

Mr. G. W. Jackson has been appointed Inspector, Diseases in Plants Acts, Brisbane.

District Inspectors of Stock have been transferred as follows:—

J. L. Bowman—from Townsville to Roma.

W. R. Holmes—from Hughenden to Townsville.

E. S. Cardell—from Charleville to Hughenden.

E. C. Lake—from Winton to Charleville.

A Northern Sanctuary.

The property known as "Kalamia Plain," at Ayr, has been declared a sanctuary for animals and birds.

Wheat Pool Act.

Regulation 5 under the Wheat Pool Act has been altered to provide for nominations being called for election as Representatives of Wheatgrowers on the Wheat Board for the season 1925-1926.

Wireless Set—Twelve Months' Guarantee.

In the Queensland Pastoral Supplies' advertisement in the last issue it was mentioned, through a clerical error, that their wireless sets carried a guarantee of one month. This should have read "twelve months' guarantee."

Check Weighmen as Inspectors.

A new regulation under "*The Regulation of Sugar Cane Prices Acts*, 1915 *to* 1922," has been approved, giving check weighmen the power of inspection of all weighbridge records of sugar-mills under the jurisdiction of the Regulation of Sugar Cane Prices Acts.

L.P.A.'s in Fruit Districts.

His Excellency the Governor, with the advice of the Executive Council, has approved of certain additional Local Producers' Associations being represented on the Banana, Citrus, and other Fruits Sectional Group Committees, formed under "*The Fruit Marketing Organisation Act of* 1923."

General Levy Limit.

Approval has been granted by the Governor in Council for the Council of Agriculture to make a regulation under "*The Primary Producers' Organisation Acts*, 1922 to 1923," providing that no general levy in respect of the year beginning 1st July, and ending on the 30th June, 1926, shall be based on an estimate to yield a sum exceeding £20,000.

Peanut Board.

The following have been appointed as elected representatives of growers on the Peanut Board:—

Charles Frederick Adermann, Wooroolin;

William Muir, Crawford;

Alfred Skinner Clark, Sandhills; and

Richard Major Wise, Buderim; together with

William O'Mara, Boonara, Goomeri,

who will represent the Council of Agriculture. These members will hold office as from the 1st September, 1925, until the 31st August, 1926.

Cheese Board Election.

Result of the ballot for Producers' Representatives on the Cheese Board:—

Anderson, Henry Thomas (Biddeston)	541
Burton, George (Cambooya)	367
Dare, Thomas (Narko, Cooyar Line)	249
Hansen, Mads Peter (Maclagan)	389
Keefer, Henry (Pittsworth)	537
O'Shea, David Gabriel (Southbrook)	445
Smith, William (Yangan)	248
Tilley, Albert George (Rose Hill, S.W. Railway)	391

As five members only were required, Messrs. Anderson, Keefer, O'Shea, Tilley, and Hansen have therefore been duly elected to the Board. In effect, the old Board has been re-elected. The Board will hold office until 30th June, 1927.

In the Milking Yard.

The milking yard, as well as the approaches and exits, should, if possible, be heavily stoned, in order that a foundation may be obtained which will not break up in wet weather and become a bog, or in dry weather create clouds of dust that are both a nuisance and a menace. Large stones should be laid down first, and on top of these finer metals or coarse river-bed gravel and pebbles. The bigger stones are necessary for a foundation, because after heavy rains small material is trampled into the soil and sinks out of sight, permitting the surface to become a quagmire. Where cattle pass through gateways there is always a crush and a rush, and it is therefore important that such approaches and exits should be dealt with just as carefully as the yards themselves.

The surfaces of all yards and approaches require to be graded to facilitate draining, and should be kept even, in order to prevent the formation of holes that will contain water. On flat country it may be necessary to provide underground drains—that is, trenches dug to a depth of 2 feet and, say, 1 foot wide, and graded to permit the soakage to get away. Filled with stones and rubble, they serve this purpose admirably.

Yards and approaches require constant care, as they are continually being worn by the cattle passing over them. If allowed to fall into disrepair, they soon become in a very bad condition, necessitating a large expenditure of time and labour to bring them back to a satisfactory state again.

The Royal Society of Queensland.

The ordinary monthly meeting of the Society was held in the Geology Lecture Theatre of the University.

Professor H. C. Richards, D.Sc., and Mr. W. H. Bryan, M.Sc., exhibited:

A. Specimens of Brisbane tuff (commercially known as "porphyry"), collected by the exhibitors from Castra, about 12 miles east-south-east of Brisbane. The interest of the exhibits was threefold: 1. They were from a new locality, being considerably east of any previously known outcrops, and measuring 30 feet in thickness. 2. The basal portions contained large angular and sub-angular blocks of rhyolite. 3. Some portions of the tuff contain numerous flattened spherical bodies of varying size but averaging about ½ inch in greatest diameter, and showing when broken a regularly concentric structure.

B. Specimens of the corals *Koninckophyllum inopinatum* Eth. fil, *Lithostrotion* (?) columnare Eth. fil, and *Syringopora syrinx* Eth. fil from the Carboniferous limestone of Lion Creek, Stanwell.

C. Specimens of *Favosites* sp. and *Heliolites* sp. from the limestone quarry at Marmor. *Favosites* sp. had been previously collected by Mr. H. A. Longman from this locality, but is here recorded for the first time, while this constitutes the first record of *Heliolites*. The presence of these two genera fixes the age of the Marmor limestone as at least as old as Devonian, and removes the possibility supported by some geologists of its being Carboniferous.

Mr. H. A. Longman, F.L.S., exhibited (1) fragments (mainly alveolar) of fossil molars forwarded by Mr. R. S. Philp, through Professor Richards, which had been found in a well at Castle Creek, Q., at a depth of 40 feet. These Pleistocene fossils probably represented a new species of *Palorchestes*. (2) A "Liangle" or aboriginal wooden battle-axe with a mucronate tip to the broad end, and carved with figures of snakes, birds, a lizard, and a frog. This elaborate specimen was obtained by Mr. H. A. Craig at Thargomindah, and presented to the Queensland Museum by Sir Matthew Nathan.

Mr. C. T. White, F.L.S., exhibited: (A) Specimens of *Agonis abnormis* (F.v.M.), White and Francis, from trees growing in fair abundance along a small creek at Castra, about 12 miles from Brisbane. The species had not been collected previously in the neighbourhood of Brisbane. (B) Specimens of *Verbesina encelioides*, B. & Hook, f., a sunflower-like plant, a native of North America, which during the past few years has proved to be a troublesome pest in several parts of Southern Queensland.

Mr. W. H. Bryan, M.C., M.Sc., read a paper by himself and Mr. C. H. Massey, entitled "The Geological Range of the Tiaro Series." As a result of their recent field work in the type district, the authors pointed out that the Tiaro series, as at present defined, is there naturally divisible into four series, which they suggested should be called the Graham's Creek Series, the Tiaro Series (in a restricted sense, but including the coal measures), the Myrtle Creek Series, and the Brooweena Series. Professor Richards, Dr. E. O. Marks, and the President took part in the discussion on the paper.

Australian Dairy Council in Brisbane.

A meeting of the Australian Dairy Council was held last month in Brisbane, at which all the States were represented, as well as both the Federal and State Governments. Two members of the State Advisory Board also were present. The chair was taken by Mr. R. Rankin, of Victoria.

Reports were read from British and Continental sources appreciative of the standardisation of Australian butter under the "Kangaroo" brand. The Council determined to maintain the "Kangaroo" standard, and considered the question of a universal system of pasteurisation for cheese making. This subject is to be taken up at the next meeting of the Council. Satisfaction was expressed at the improvement in co-ordination between Commonwealth and State grading and general administration, and the hope was expressed that much more might be yet achieved in the same direction.

The project of establishing an Australian Dairy College, where practical and theoretical studies could be pursued, and where research work could be done, on the lines adopted in Denmark and other dairying countries, was brought forward. Mr. P. J. Carroll, Commonwealth Supervisor of Dairy Exports, is to be asked at an early date to convene a conference of Federal and State experts to draft suggestions on the subject.

A sub-committee was appointed to confer with the Dairy Produce Control Board to consider proposals for co-ordinating the functions of the two bodies.

The work accomplished by the Council is to be tabulated and distributed to producers, together with the outline of a more extended policy which it is proposed to undertake.

Concerning the proposed prohibition of boric acid in butter imported into England, it was held that such action at the present stage of development would be most detrimental to the sale of Australian produce in London, owing to the long period of transport. In the absence of proof that the use of boric acid in the quantities now employed is in any way injurious to health of consumers, it was decided to ask the Commonwealth Government to discuss the matter with the Imperial Government.

The Council unanimously supported a suggestion to secure interstate competition in all competitive exhibitions held annually in the large producing States.

Health authorities of the various States are to be urged to call a conference on food standards at an early date to discuss the suggested reduction of the fat standard for local and interstate butters, so that unanimity may be reached.

It was mentioned that the term for which members of the Dairy Council were elected will expire next month, and an election will be held in each State, in the same manner as previously.

Caring for the Milkers.

Among the important points in the care of a dairy herd is the necessity for keeping the milkers away from weeds. Ordinary food-flavours from such fodders as lucerne, clover, silage, &c., can be removed by aeration and cooling of milk and cream on the farm and pasteurisation at the factory; but strong food-flavours or taints, such as from carrot weed, cannot be got rid of.

As to water, clean, fresh, running water is best, and next to it comes good spring or well water pumped into troughs. Water contained in dams, marshes, or stagnant pools is bad, and is swarming with harmful germ life. Milking cows should be prevented from wading into such places, otherwise they bring the contamination into the milking-yard by the mud which clings to their skins. Those in this state should be brushed and wiped, and have their udders washed before milking. The same applies when they have to wade up to their bellies through muddy yards. If this is not done, the dust from the dried mud falls into the milk bucket, and the dirt on the udder and teats oozes through the milker's fingers and mixes with the milk, which then produces fermented and badly-flavoured cream.

Milk should be well strained. A filter cloth fitted on top of the gauze of the strainer would greatly help in improving the milk. These cloths should be destroyed or thoroughly boiled for twenty minutes before being used again.

Give the cows high, dry ground to camp on. The infections caught in low-lying, swampy ground and stagnant water cause most unclean flavours and smells in cream and butter, and they are also often responsible for fermented cream and sour milk. In wet weather scrape the cows before milking with an iron hoop to prevent drips from falling into the bucket. Milk from sick or diseased cows should not be used for human consumption, or for making butter or cheese. The milk from injured teats should be thrown away. There are periods, too, in the life of the cow when the quality of the milk is affected; so seriously at times as to make it unfit for use.

Be very careful about mammitis. Milk from quarters so affected is not good. Throw it away; or, better, destroy it altogether.

Insect Control by Aeroplane.

The commercial peach crop is the latest to receive treatment by the aeroplane dusting method for controlling insect pests. According to a report received by the Bureau of Entomology of the United States Department of Agriculture from its field station at Fort Valley, Georgia, this process was tried for the first time in March of this year. Aeroplane dusting for cotton fields has been a demonstrated success, and the outcome of this type of control for insects affecting peach trees will be awaited with interest.

It took an hour and fifty-five minutes to dust 10,000 peach trees with a mixture of arsenate of lead and hydrated lime. The time recorded included all trips to the landing field to refill the hopper. A thousand acres of peach trees in Georgia are to be treated by aeroplane during the season. It is expected that this work will yield valuable data on the results, cost of operation, and other points.—"The American Fertiliser."

State Stallions.

Replying to a question in Parliament by Mr. W. Deacon (Cunningham), the Minister for Agriculture and Stock (Hon. W. Forgan Smith) said:—The number of Clydesdale stallions used for the service of mares for the season 1924-1925 was increased from five to eight by the inclusion of two belonging to the department, which were seconded from the State Farms at Gindie and Hermitage respectively. In all, 355 mares were served; the fees earned amounted to £955 10s. The total cost of the stallions during the 1925 season was £1,213, giving an average cost of £151 14s. 2d. for each stallion. The total expenditure to 30th June, 1925, on all stallions was £6,875; total earnings, £1,652. In reply to another question, the Minister stated that the number of the State stallions now alive was five, of which one, however, was no longer fit for service.

A statement concerning the mares served in 1923 showed that the total number served by six stallions was 334; but the owners of thirty-six of these had failed to reply to the department's circular of inquiry since sent out; the number of mares known to be in foal was 152. Mean percentage of foals, 51 per cent. Generally, weather conditions were very dry during this particular season.

Lucerne—Cultivation and Early Mowing.

Lucerne sown in autumn should receive no cultivation until the following spring at earliest. The young plants are tender, and will not stand rough handling. On friable, loose soil especially the effect of cultivation would be to pull many of the plants out, and consequently the harrowing must be light, and should not be attempted until the roots have a firm hold; but after the second cut, particularly on ground that sets hard, the harrow can be used.

The method of keeping early spring weeds in check is to mow frequently. The mower should be put over the crop before any of the weeds have commenced to flower, and the operation should be repeated a month or two afterwards. Two mowings will generally be sufficient. This must not be omitted if weeds are getting a foothold, even if the lucerne is not ready to cut, as the object is to destroy the weeds. If the quantity should warrant it the cut material can be raked for green feed, but if left on the ground it makes a useful mulch.

Once lucerne becomes well established its vigorous growth keeps most weeds in check, but a certain amount of cultivation is necessary. A rigid-tine cultivator is the most suitable implement. The lucerne field should be given a thorough stirring with this early in the summer, and, if necessary, again later in the season. The disc cultivator may be used instead of the rigid-tine cultivator. The discs should be set rather straight. The loosening of the surface allows moisture to percolate to a greater depth, and prevents it from flowing away over the surface. Owing to the depth to which even light showers then penetrate, less loss occurs through evaporation. The splitting of the crowns by the discs encourages tillering, and the crop thickens.

If a rigid-tine cultivator is not available, a spring-tooth cultivator can be used very effectively, and one fitted with special narrow tines is satisfactory on moist ground. The spading harrow is also a useful implement for the cultivation of lucerne fields.

The value of top-dressing established plots of lucerne with superphosphate has frequently been referred to in these notes. The outstanding advantages of such a top-dressing may be summarised as follows:—(1) The green fodder yield is greatly increased; (2) a better-quality product results; (3) the general condition of the stand is built up consequent upon the vigorous growth developed; and (4) the useful life of the stand may be extended, and depleted stands largely restored.

Self-Help in Farming—Join an L.P.A.

"There is not a pot of gold at the end of the legislative rainbow. There is no magic power in legislation as a panacea for agricultural difficulties—we can have a prosperous agriculture only if the basis upon which it is built is sound. Like the manufacturer, the farmer must study his market and adjust his production to the demands of the consumer. He must adopt the most efficient methods of farming, which yield him maximum net returns for his capital and lay-out. He must improve and standardise the quality of his product in order to command the best market prices. And he must market his products in the most efficient way. The efficient farmer will succeed; the inefficient farmer will ultimately fail."

With this summary of the situation, William M. Jardine, the recently appointed United States Secretary of Agriculture, outlines a plan of action that will be based principally on helping the farmer to help himself.

One of the best means of self-help—or, rather, mutual help—available to farmers in Queensland is membership of a Local Producers' Association.

Grasshopper Control—A Seasonable Reminder.

It is again seasonable to remind farmers as to the protective measures necessary if they would safeguard their crops from grasshopper invasion.

Normally, the first grasshopper swarms hatch in September from eggs laid the previous March and April. They grow gradually, and become winged in November and December. These winged swarms lay eggs in the ground. The eggs hatch in three weeks, and the second hopper swarms appear during December, January, and February, and become winged flying swarms during March and April. These second-winged swarms lay eggs which remain in the ground unhatched until spring (September).

Egg-laying is effected by the swarms in comparatively limited patches of ground, varying from a few square yards up to thousands of square yards, according to the size of the swarm. The swarms, when laying, usually mass together for a day or two on some bare or thinly-grassed lands, and deposit their eggs 1 to 2 inches below the surface. By noting the position of the egg-bed areas it is possible to spray the tiny young hoppers immediately they emerge and before they grow and spread. By organising and spraying these patches of young hoppers within the first three weeks after emerging from the ground, the majority of hoppers can be killed before they do any appreciable damage, and the pest can thus be controlled.

Spraying with arsenite of soda is recommended, and is perfectly harmless to stock under practical field conditions. The formula recommended is:—Arsenite of soda, 1 lb.; treacle, 4 lb.; water, 16 gallons. An important point in mixing is to dissolve the arsenite of soda in a kerosene tin or more of hot water, and to dissolve the treacle in a separate quantity of hot water, allowing both mixtures to cool before bringing them together, when the whole can be made up to the 16 gallons.

The spray should be applied to a strip of grass about 30 feet wide around each swarm, as well as directly on to the hoppers themselves. The spray kills both by direct contact with the bodies of the grasshoppers and by poisoning the grass on which they first feed.

The spray mixture can be carried to the swarms in petrol tins, two in a case, with a hole in the top of each tin sufficiently big to admit the foot of the pump; a large number of tins can thus be carried on a spring-cart, from which the infected ground can be sprayed. Spraying may be light, but it should be done thoroughly, and the spray applied in a fine mist. For this purpose a small bucket pump will be found satisfactory. Twenty-eight pounds of arsenite of soda and 1 cwt. of treacle will make a sufficient quantity of spray to treat 6 acres actually massed with hoppers.

In cultivation paddocks a poison bait made up of 1 lb. arsenite of soda or paris green, 1 lb. molasses or treacle, and 24 lb. bran may be used. Stock must not be permitted where these baits are employed.

United action is essential for success in grasshopper control. The coping with an invasion is a community problem, and should be taken up as such. The best results can be obtained only when every landowner is on the lookout for trouble and is prepared to combat it. Eleventh-hour measures are not so easily carried out, nor are they so effective as those taken in ample time. The best time to destroy the grasshoppers is before they reach maturity, and particularly during the first two or three weeks after hatching. For this reason landowners should watch their fields for the appearance of the insects, and spray the hoppers while they are in the massed state.—"Agricultural and Pastoral Notes," N.S.W. Department of Agriculture.

Queensland Wheat.

The Registrar-General (Mr. G. Porter) supplies the following return showing the result of the wheat crop of Queensland for the season 1924:—

Division.	Grain.		Hay.	
	Ac.	Bush.	Ac.	Tons.
Moreton	273	4,008	3,342	3,996
Wide Bay	748	8,520	422	434
Port Curtis	66	418	238	299
Edgecombe	—	—	2	2
Rockingham ..	10	260	63	49
South-Western ..	—	—	21	14
Central	11	110	56	40
Maranoa	15,060	164,293	1,214	1,309
Downs	172,977	2,602,220	4,099	3,708
Total, 1924 ..	189,145	2,779,829	9,457	9,851
Total, 1923 ..	51,149	243,713	8,714	5,095

Early Ploughing Pays—Southern Experiments with Maize.

Experiments with maize at Grafton Experiment Farm last season again demonstrated the advisability of early ploughing for maize.

Four plots were planted with Leaming maize as follows:—(1) (Check) ploughed in April. (2) Ploughed in June. (3) Ploughed in August. (4) (Check) ploughed in April. On plots (1) and (4), the maize stubble, after being chopped, was ploughed under on 12th April, and this was followed by disc harrowing on 24th April, 30th June, and 17th July. On plot (2) the maize stubble, after being chopped, was ploughed under on 18th June, and the disc harrow followed on 30th June and 17th July. On plot (3) the maize stubble, after being chopped, was ploughed under on 15th August and the disc harrow followed on 5th September. On 6th September the whole experiment area received a harrowing, followed on 11th September by spring-toothing and harrowing. Planting was carried out on 12th September, an excellent germination being obtained throughout. Cultivations in the growing crop consisted of harrowing on 3rd October, cultivation on 29th October, hilling on 11th November, and cultivation on 26th November. All plots received similar treatment from time of planting.

From germination onwards, the August-ploughed plot could easily be distinguished by its yellowish appearance and much less vigorous growth, when compared with the earlier-ploughed plots. Shortly after tasselling the maize in this plot burnt off quickly, and the majority of the cobs harvested were small and light. Practically no difference in growth was noticeable between the April and June plots.

The acre yield based on percentage from the August-ploughed plot was 27 bushels 37 lb.; from the June-ploughed plot it was 45 bushels 23 lb., while the average of the April-ploughed plots was 48 bushels 21 lb. June ploughing, therefore, gave an increase of 17 bushels 42 lb. over August ploughing, and April ploughing an increase of 20 bushels 40 lb. The values of these increases were £2 13s. 3d. and £3 2s. 2d. respectively. The cost of the increase was 2s. 3d. and 4s. 6d., leaving a gain of £2 11s. in the case of June ploughing and of £2 17s. 8d. in the case of April ploughing.

In making this calculation maize was valued at 3s. per bushel, and disc harrowing at 2s. 3d. per acre, the April-ploughed section receiving two additional disc harrowings, and the June-ploughed section one additional.

This season's results are very similar to those obtained last year, and only go to show that early preparation of the land will result in increased yields. When early ploughing is practised the land lies fallow for a few months, and during this period it is possible to conserve a large supply of moisture.

The physical condition of the soil is vastly improved by weathering and by decomposition of stubble, weeds, &c., during such a period of fallow, and a good deal of insoluble plant-food is changed into a more soluble form in which the following maize crop can readily make use of it.

In a season such as that just past, moisture conservation was only of secondary consideration, for good rains fell throughout the growing period. While no doubt this was one of the factors that accounted for the large increase in the winter-ploughed plots, it would appear that the early aeration, sweetening, and weathering down of the soil play a very big part in insuring larger returns.

Citrus Fruits from the Bloomfield River.

Mr. E. G. Olafson, of Ayton, Bloomfield River, N.Q., who is engaged in general farming, has sent us some excellent samples of citrus—mandarins and oranges—from his orchard. They were the produce of seedlings which, in Mr. Olafson's experience, give quicker and better returns in the North. As elsewhere in the State the marketing problem is a real one to Northern fruitgrowers. Fruit is an essential tropical diet, and its regular and sufficient supply at reasonable prices is a matter that should be taken in hand immediately, if we are to improve the conditions of living north of Capricorn.

Dairy Washes—Three Useful Formulæ.

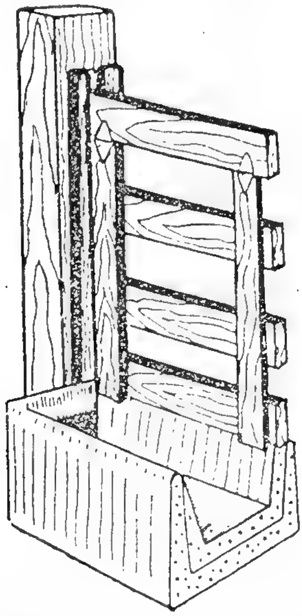
The following wash is used by many dairy farmers, and has been proved satisfactory at Hawkesbury Agricultural College:—Mix air-slaked lime with freshly skimmed milk to a suitable consistency so that it can be applied smoothly with the brush. To each gallon of this cream-like mixture add 1 oz. of ordinary table salt. It is advisable to make just sufficient wash for the day and to use it fresh. This wash dries readily on wooden or iron surfaces. It adheres firmly, does not flake off, and the materials are always at hand on dairy farms.

The following is also said to be a good wash for the walls of dairies:—Slake ½ bushel of quicklime in boiling water, strain through a sieve, and add 2 lb. sulphate of zinc and 1 lb. common salt, dissolved in warm water.

A very satisfactory and easily prepared wash may be made by slaking some lime and adding 1 pint boiled oil (linseed) to every gallon of the wash. Dilute with water to the required consistency.

PIGGERY SWING DOOR.

The principle of the swinging door before the pigtrough so that the pigs can be kept back from the trough while it is being filled is familiar to every pig breeder; but the open construction of door is uncommon. It is suspended from the top bar by strap hinges. The bottom of the door strikes against the outside edge of the trough, which acts as a stop. The trough is of reinforced concrete, about 5 feet in length, and with inside measurements of 7 inches in depth, 10 inches wide at the



top and 8 inches at the bottom. This is reinforced with chicken wire. If desired, the top may be protected by strips of strap iron held down with small bolts set in while the mixture is still soft. The trough was made in a mould of the outside dimensions, and with a smaller trough of the inside dimensions placed upside down in the centre of the mould. A concrete trough is durable, does not get nosed about, and is easily cleaned.—"Australasian."

Answers to Correspondents.

Horse Bleeds from Nose.

Case:—A saddle hack of about ten years old used constantly for mustering cows, stock, &c., with the result that when he has any heavy work he is subject to a snotty nose and continual bleeding from his nostrils. Is this a trouble that can be remedied, and how?

Reply:—Veterinary Surgeon McGown replied:—This complaint is not uncommon in horses, and may be due to several causes, such as rupture of some small blood vessels in the head, polypus, inflammation or ulceration of the nasal mucous membranes. If the trouble is due to the former, complete rest is recommended, as strain through overwork usually brings on bleeding from the nose. A saturated solution of alum should be injected into the nostril, which should afterwards be plugged with cotton wool. If there is any suspicion of a polypus, this ought to be removed, but should only be done by a qualified veterinary surgeon. If inflammation or ulceration be suspected, apply ice to the front of the face. Inject the nostril with the alum solution two or three times daily.

Vaginitis.

Case:—A Hereford cow that dropped her third calf on the 9th May was purchased on the 11th May, and the calf taken from her the following day. She gave about 2½ gallons of milk in twenty-four hours, with a high test until the 21st May. Then, when driving her to the yard it was noticed that she passed from the rectum a quantity of matter about the size of a man's fist. It appeared to be a whitish, semi-transparent phlegm. Two days after she held her milk back, and what milk she gave was slightly tinged pink. On examination, after being left to stand, the cream appeared to be quite good, with a pink tinge still in the milk. The colouring matter did not settle but remained equally distributed in the milk. On the next day the pink tinge was more pronounced and the milk supply fell off still further. On the following day she began to lose condition. She ate and drank very little. She would rush eagerly to a supply of lucerne hay and water, but, after sniffing it, would eat or drink nothing. On the seventh day after sickness was first noticed, the pink tinge was entirely gone from the milk. The nose and eyes were a dark yellow. The udder took on a yellow tinge, with a sort of dry scale which brushed off when rubbed. She was still losing condition. Two days later the yellow tinge spread to the teats, these getting scaly, and there was a discharge of thick, yellow, slimy matter from the nostrils. Three weeks after the first sign of trouble the yellow tinge round the eyes and nose began to disappear, the powdery substance was gone from the udder, and the cow was eating and drinking a little. In a few days more she began to lose all signs of illness and to pick up strength. She came back to a gallon of milk. What was the trouble?

Reply:—Veterinary Surgeon McGown replied: From the symptoms described this animal suffered from a low form of vaginitis, termed 'leuchorrhea.' In treating such cases the vagina should be syringed out twice daily with tepid water, followed with an injection of alum and water. The quantities required are 2 oz. alum to one quart tepid water. The following powder, given once daily as a drench, will have a beneficial effect:—2 drachms powdered sulphate of iron and 4 drachms powdered gentian. This is best given mixed with oatmeal gruel.

Feeding Poddy Calves.

F.E. (Mackay)—

In practice it is difficult to find a substitute upon which calves will thrive as satisfactorily as when fed upon their natural diet (milk). In some cases calves are fed upon skim milk, that is milk from which the cream has been removed. You do not state whether whole or skim milk is available. If skim milk is used it would be advantageous to add 1 to 4 oz. of linseed meal daily to the skim milk. The whole milk would, of course, be a complete ration without any addition, and the calf would require from 8 to 10 lb. of milk per diem.

In the event of there being neither skim nor whole milk available in sufficient quantity, 2 to 4 oz. of linseed meal, together with a similar quantity of maize meal and pollard combined, to which a sufficient quantity of luke warm water is added to make the mixture of the consistency of a very thin gruel, also a little salt in addition, would make a comparatively satisfactory ration.

In every instance the artificial food will be greatly enhanced in value, if a little milk is added, even such a small quantity as a half-pint at each meal.

For the first four weeks the calf should be fed upon a milk diet solely, and the artificial foods introduced gradually, reducing the supply of milk and increasing the artificial food from time to time. Very young calves should be fed three times a day, and as the become stronger, the feeding should be twice daily.

A calf will eat a small quantity of grass at an early age, if available, and care must be taken that the calf has access to a clean grass patch. If kept in a restricted area, the grass will become contaminated by the excreta from the calf.

Piles in Pigs.

L.G.H. (Woolooga)—

The Instructor in Pig Raising (Mr. Shelton) advises that in order to be successful in treating the sick pigs for the trouble referred to it will be necessary to give them a complete change of food and the use of barley meal and skim milk, fed warm, and in small quantities only, about four or five times per day. Prior to this the pigs should be given a good dose of castor oil (say two tablespoonsful to each pig) as a drench in warm milk, the oil to be given two or three hours before the feed during the morning. Protrusion of the rectum (or as it is commonly called "piles") is due to severe constipation or sometimes also to diarrhoea, but in the case of your pigs it would appear to be due to over-feeding, though you do not state the nature of the food given to them. To relieve the condition, the bowels must first be emptied of the bulk of their contents by the use of a purgative; the pigs should then be fed very lightly for a fortnight or so on soft, easily digested, nourishing food. Do not attempt to do more than temporarily satisfy their hunger, but allow them plenty of green lucerne or soft succulent grass or herbage and plenty of drinking water. To relieve the condition of the protruding bowel, the parts should be washed with warm water to which has been added some disinfectant, such as lysol. If the bowel can be replaced in its normal position while the animal is on low diet, it will be found to remain in position much longer than if the pig is on full feed. It might also be possible to temporarily plug up the opening with some cotton wool padding, but this requires constant attention. The animals must, of course, be confined in a very clean sty and should be kept very quiet. The treatment must be preventive to a large extent, and it is impossible to relieve the condition unless strict attention is paid to the diet and supply of food. In future, it is suggested that the pigs be fed along better lines, otherwise there might be a recurrence of the trouble, for there is no "cure-all" for this any more than there is for other diseases to which these animals are subject.

Parasite on Pigs.

W.R.R. (Baffle Creek)—

The Instructor in Pig Raising (Mr. Shelton) advises:—The best preparation I know of for ridding pigs of lice and fleas is a mixture composed of—Benzine, ½ pint; kerosene, ½ pint; fish oil, 7 pints, mixed together and applied as per directions herewith. If fish oil is not available you could use raw linseed oil or crude oil or any other oil available, waste machine or separator oil, &c. It is preferable that the pigs be first washed or hosed over to rid them of accumulations of mud, &c., the lice mixture is then best applied per hand, but if the pigs are not sufficiently quiet the mixture can be sprayed over their neck and back, making certain that the mixture penetrates into the wrinkles along the neck and side, as well as to the inside of the ears, down the hind leg, and in the crevices about the hock. This is comparatively easy when the oil is being applied per hand, but if you obtain a mop and saturate same with the oil you could apply same to practically all the exposed surfaces. At any rate, try spraying the mixture and watch the result.

It is necessary to repeat the treatment in about ten days' time in order to kill off the brood of young lice which will have hatched out from the "nits" or eggs in the interim.

Whitewashing the pens and keeping them free of accumulation of rubbish, cobwebs, &c., will all tend to keeping the piggery free of lice, and regular treatment of infested animals will be found very effective.

Worms in Pigs.

G.H.C. (Atherton)—

You do not mention just what food you are using for your pigs, hence one suspects that they have had access to worm carcases of sheep, cattle, or horses. Worms develop from worm eggs only, they cannot develop from any other source, hence the worms have found their way to your premises either by medium of other diseased beasts, or by wormy pigs from other studs. Doubtless we have something to learn yet in the direction of finding out whether it is possible for worms to develop in pigs as a result of their ingesting the eggs of worms whose hosts are other than domestic animals. For instance, we know that kangaroos, wallabies, foxes, dingoes, &c., are all subject to infestation by a variety of worms, hence it is more than likely your pigs running on new ground along the course of a creek which overflows its banks occasionally may have picked up a number of worm eggs in this way.

This all points to the necessity for absolute cleanliness and for efficiency in management. All new purchases should be carefully quarantined for a period of at least three weeks. The pigyard should be regularly raked and all old corn cores and other accumulations of rubbish be burned to ashes on the spot.

If convenient, dig the yards up, and if the pigs have a run plough this up also and allow it to sweeten and dry. It would be preferable to rearrange your yards and to fence in new ground altogether.

Liming the yards is recommended also, and if new yards are built cultivate the old yards for a year or two before laying them down in grass again.

See that your breeding sows have ample run in the sunshine, and see that the sunshine has access to the pig sties, for it is the most efficient germicide known. Careful attention to the feeding of the pigs and to matters of management generally will help considerably in your clean up.

Disease in Pigs.

H.M. (Peeramon)—

The trouble is probably due to tuberculosis.

Diseases are largely controlled if not prevented entirely by efficient management, which would, of course, include preventive measures, in seeing that no diseased animal is allowed to enter the herd and no foodstuff used about which there is the slightest doubt, without first of all being sterilized by boiling or by other means.

The Instructor in Pig Raising (Mr. Shelton) strongly recommends a thorough clean up of your pig premises, wards, &c. The sties should first of all be carefully overhauled, repaired, and put into the best order possible, then thoroughly washed over with hot limewash, inside and out, and this limewashing should be repeated, say, in three months' time; the floors of the sties should be given special attention to see that they can be kept clean and dry. They should then be sprinkled with air-slacked lime and be swept out regularly, and kept clean at all times. The pigyards should be well raked over and all rubbish, old corn cores, &c., burned to ashes.

If convenient, dig the yards up, and if the pigs have a pig run plough this up also, and allow it to sweeten and dry. It would be preferable to rearrange your yards and to fence in new ground altogether.

Liming the yards is recommended also, and if new yards are arranged for cultivate the old yards for a year or two before laying them down in grass again.

See that your breeding sows have ample run in the sunshine and see that the sunshine has access to the pig sties, for it is the most efficient germicide we have yet discovered.

Careful attention to the feeding of the pigs and to matters of management generally will help considerably in your clear up.

Pigs require ample supplies of green food in addition to milk and maize, such crops as lucerne, rape and barley, saccaline, cow cane, cowpeas, sweet potatoes, &c., being recommended.

Sterility in Sow.

H.B. (Kinleymore)—

It is difficult to advise as to the best treatment in the case of a sow that fails to breed regularly, for there is a variety of causes for sterility in breeding stock. In Mr. Shelton's opinion it does not pay to retain stock which fail to produce satisfactory litters, that is unless the condition is due to the boar and sows being over fat and lethargic and disinclined to do other than eat and sleep.

It is good to note that you have provided a suitable grazing area for your breeding sows, and that the results in this direction have proved satisfactory. It is not desirable in a general way to allow the boar to run with the sows for it is very difficult to keep record of service dates and of anticipated farrowings; then again many animals are knocked about unnecessarily when allowed to run together, this especially so where an active, strong, vigorous sire is being used. It pays much better to keep the boar in a small paddock and to allow the sows to run with him only at the time they are actually ready for service.

You will find that it pays also to feed abundant supplies of green food to your pigs, and to allow them clear drinking water *ad lib.*

"Thick Neck" in Pigs—Mineral Mixtures for Pigs.

F.E.B. (Tarcutta, N.S.W.)—

We have no record of animals having been cured by direct external application of iodine to the affected parts, but satisfactory results have been obtained by its use internally in cases of "thick neck," goitre, hairlessness, and other deficiency troubles.

Treatment, however, goes hand in hand, Mr. Shelton advises, with the use of mineral mixtures which tend to make up the deficiency of bone-forming materials in the food and to supply necessary vitamines. The formula which has proved most successful for this purpose is made up as follows:—

Mix together, common salt	20 lb.
Finely-ground raw bonemeal or steamed bonemeal	40 lb.
Finely-ground high calcium limestone, wood ashes, finely-ground oyster shell or thoroughly air-slacked time	40 lb.

To each 100 lb. of this mixture add 10 lb. of sulphur and from ½ to 1 oz. or more of potassium iodide.

Mix all thoroughly together, place in a clean, dry wooden trough, and place in a position well protected from the weather, where the pigs can have access to it at all times.

Besides the immediate value of giving mineral to pigs, there has been found a cumulative value in the case of breeding stock. For instance, in trials at the Iowa Experiment Station (U.S.A.), the first generation of sows to which minerals were given showed but slight advantage over young sows to which no minerals were given. The second generation showed some positive sign of benefit, chiefly in an increased height and length. In the third generation the advantages were plainly evident in the added increase in weight.

It appeared to the investigators that there is a tendency for the benefits of minerals to become apparent to a greater degree as the generations unfold. It is, of course, wise policy to look ahead in the breeding of all classes of live stock.

Pigs should always have access to good succulent pasture and to young crops, lucerne, rape, &c., on cases where the supply of green food and minerals have both been liberal, the results have been outstanding.

The provision of mineral mixtures certainly has a tendency to check the development of such diseases as rickets, paralyses of the hindquarters, staggers, &c., which in many instances owe their origin to weakness due to improper feeding and lack of minerals.

Trouble with Breeding Sows.

H.H. (Pittsworth)—

Troubles of the nature described running through a herd are most unusual. In addition to preventive treatment, Mr. Shelton strongly advises a thorough clean up of your pig premises, whitewashing with hot limewash the pigsties and outside of troughs, &c. The feed troughs should be scalded out and be placed in the sun to dry and sweeten, while the floors of the pigsties, after being thoroughly scoured, should be sprinkled with air-slacked lime. The yards should be raked, and all rubbish burned; they should be sprinkled with lime also. If possible, dig the yards up, turning over the soil to sweeten and dry.

The provision of a good grazing run for the breeding sows is well worth thought if you have no pig paddocks, and the use of plenty of green fodder and of clean water will add to the comfort and well-being of the animals. It does not, however, pay to retain unsatisfactory breeding stock or sows that fail to produce litters freely, regularly, and of good type and vigour.

Insect Attack on Cabbage Plants.

M. Van I. (Gladstone)—

You are evidently troubled with some form of leaf-eating insect, and the Entomologist suggests that you try spraying the plants with a solution of arsenate of lead, 3 to 4 lb. of the paste or 1½ lb. to 2 lb. of the powder to 100 gallons of water. If you prefer dusting the poison on, use 1 lb. of the powder to 6 or 7 lb. of dry finely-sifted ashes, and apply before the dew is off the young plants.

Pig Crosses.

H.F.R. (Marburg)—

A series of practical experiments to test various breeds and cross breeds with a view to obtaining informative data thereon is being arranged. These experiments will be conducted on approved farms and with approved pigs in approved localities. The Berkshire-Tamworth cross, for instance, is regarded by most bacon-curers as an ideal pig, maturing to prime bacon weights at from five and a-half to six months old, but there are other crosses well worth trial, such as the Poland-China-Tamworth cross and the Yorkshire-Berkshire. Then there are breeds like the Duroc-Jersey, which is noted for quick growth and early maturity, either in the pure state or when crossed with the Berkshire or similar types.

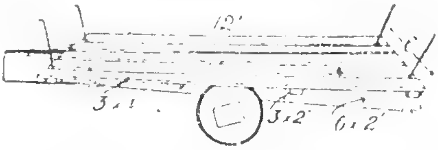
Many farmers claim to be able to produce prime bacon pigs at from five to six months of age. Some even claim to have marketed baconers under five months old, but they do not generally keep reliable records of dates of birth, weaning, and other particulars; hence their statements must be taken for what they are worth. Mr. Shelton advises that if bacon pigs can be successfully marketed *continuously* at around 100 lb. dressed weight, doubtless it will be possible to produce them at around five months old. The matter is one well worth very careful consideration and experiment, for it is an all-important one to the pig farmer.

LESSONS OF THE SHOW—HIGH STANDARDS SET.

The chairman of the Council of the Royal National Association, Mr. W. J. Affleck, at an official Show function, said "he had sat on the council of the Association for almost half his lifetime, and he sometimes wondered whether the pride he had in the Association's achievements and in its progress was more than a proper pride. Yet he had felt that this great Show, staged in their jubilee year, was a wonderful achievement for so young a country. It showed the enterprise of their people, as well as the richness of the State. It showed what standards some of their best producers had reached, and it set standards for all the others. They were very high standards that were set here. This country of theirs differed greatly from most of the other agricultural countries of the world in that the measure of its agricultural production was different. In the thickly settled countries the measure of production was the yield per acre. In this country it would be for many years to come the yield per man; yet to increase the measure of his production, every man must use none but efficient machinery, efficient stock, efficient methods, and efficient labour. That was the great lesson which such a Show as that taught, and the teaching of that lesson alone made all their efforts worth while. It might fly in the face of some of their present-day thought, but that made it more necessary that it should be taught, and that convincingly. His council was deeply grateful to all those who had contributed so much to the success of the Show, to the exhibitors who had done so splendidly, to the public who patronised the Show so well, to the secretary and his staff for their zeal and thoroughness."

THE TILBA TROLLEY.

When green crops are cut for silage there is a great deal of heavy handling, if ordinary drays or waggons are employed for carting. The "Agricultural Gazette" of New South Wales, gives an illustration of a low two-wheeled trolley, which farmers at Tilba, on the South Coast, have evolved. Two wheels of solid wood, from 20 inches to 24 inches high and 5 inches to 6 inches thick, are tyred with old tyring iron, and provided with an axle of 1½-inch iron. On the axle and fastened to it by iron clips, rest two pieces of 6-inch by 2-inch timber, so placed that they are 6 feet apart at the rear end and close together at the front, forming thus a broad V with the sharp end in front, and the axle about half way along the sides. These two heavy timbers, however, do not come quite together at the front. Working between them on a strong swivel bolt is a large iron-shod block of wood which rides on the ground as a sort of slide. To this front block are attached the chains by which



the trolley is drawn. Resting on the 6 by 2 bed pieces is the platform, on which is loaded the fodder. This platform is usually about 12 feet long by 6 feet broad, and it generally consists of a framework of 3 by 2 timber, covered with flooring or 3 by 1 battens. Four corner posts, of 3 by 2, are sometimes bolted, sometimes socketed into the frame to keep the material on the trolley while it is being moved. Sometimes these four corner posts are simply four iron uprights, as in the illustration, sometimes they are missing altogether. The trolley is so constructed that, when it is loaded, it practically balances on the wheels, with not too much weight forward, so that as the horses move forward the front of the swivel block is slightly lifted, though its middle and rear still travel on the ground. If the load is placed too far forward, the swivel block will not lift at all and may carry into ploughed or heavy ground.

Photo.: N. A. R. Pollock.]

PLATE 86.—ELEPHANT GRASS ON THE ATHERTON TABLELAND

Farm and Garden Notes for October.

Field.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, cowpeas, sorghums, millet, panicums, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, tumeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred.

Kitchen Garden.—Our notes for this month will not vary much from those for September. Sowings may be made of most vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 ft. apart with 18 in. between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Spraying for fungoid diseases should be attended to, particularly all members of the *Cucurbitaceæ* and *Solanum* families, of which melons and tomatoes are representative examples. Give plenty of water and mulch tomatoes planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

Flower Garden.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant tuberose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

Orchard Notes for October.

THE COASTAL DISTRICTS.

October is frequently a dry month over the greater part of Queensland, consequently the advice that has been given in the notes for August and September regarding the necessity of thorough cultivation to retain moisture is again emphasised, as, unless there is an adequate supply of moisture in the soil to meet the trees' requirements, the coming season's crop will be jeopardised, as the young fruit will fail to set.

Thorough cultivation of all orchards, vineyards, and plantations is therefore imperative if the weather is dry, as the soil must be kept in a state of perfect tilth, and no weeds of any kind must be allowed to grow, as they only act as pumps to draw out the moisture from the soil that is required by the trees or fruit-yielding plants. Should the trees show the slightest sign of the want of moisture, they should be given a thorough irrigation if there is any available means of doing so, as it is unwise to allow any fruit trees to suffer for want of water if there is a possibility

of their being supplied with same. Intermittent growth, resulting from the tree or plant being well supplied with moisture at one time and starved at another, results in serious damage, as the vitality is lessened and the tree or plant is not so well able to ward off disease. A strong, healthy, vigorous tree is frequently able to resist disease, whereas when it has become debilitated through neglect, lack of moisture or plant food, it becomes an easy prey to many pests. If an irrigation is given, see that it is a good one and that the ground is soaked; a mere surface watering is often more or less injurious, as it is apt to encourage a false growth which will not last, and also to bring the feeding roots to the surface, where they are not required, as they only die out with a dry spell and are in the way of cultivation. Irrigation should always be followed by cultivation, so as to prevent surface evaporation and thus retain the moisture in the soil.

All newly planted trees should be carefully attended to, and if they show the slightest sign of scale insects or other pests they should receive attention at once. All growth not necessary to form the future tree should be removed, such as any growths on the main stem or main branches that are not required, as if this is done now it will not only save work later on, but will tend to throw the whole strength of the tree into the production of those limbs that will form the permanent framework of the tree. In older trees all water sprouts or other similar unnecessary growth should be removed.

Keep a good lookout for scales hatching out, and treat them before they have become firmly established and are coated with their protective covering as they are very easily killed in their early stages, and consequently much weaker sprays can be used. The best remedies to use for young scales hatching out are those that kill the insects by coming in contact with them, such as miscible oils, which can be applied at a strength of 1 part of oil in 40 parts of spraying material and will do more good than a winter spray of double the strength. In the use of miscible oils or kerosene emulsion, always follow the directions given for the use of these spraying materials, and never apply them to evergreen trees when they are showing signs of distress resulting from a lack of moisture in the soil, as they are then likely to injure the tree, whereas if the tree is in vigorous growth they will do no harm whatever.

All leaf-eating insects should be kept in check by the use of an arsenate of lead spray, taking care to apply it as soon as the damage appears, and not to wait till the crop is ruined. Crops, such as all kinds of cucurbitious plants, tomatoes, and potatoes are often seriously injured by these insects, and the loss occasioned thereby can be prevented by spraying in time. In the case of tomatoes and potatoes, a combined spray of Bordeaux or Burgundy mixture and arsenate of lead should be used, as it will serve the dual purpose of destroying leaf-eating insects and of protecting the plants from the attack of Irish blight.

Grape vines require careful attention, and, if not already sprayed with Bordeaux mixture, no time should be lost in applying this material, as the only reliable method of checking such diseases as anthracnose or black spot and downy mildew is to protect the wood and foliage from the attack of these diseases by providing a spray covering that will destroy any spores that may come in contact with them. The planting of bananas and pineapples can be continued during this month. See that the land is properly prepared and that good healthy suckers only are used. Keep the plantations well worked, and allow no weed growth. Keep a very careful lookout for fruit flies; destroy every mature insect you can, and gather and destroy every fallen fruit. If this is done systematically by all growers early in the season, the subsequent crop of flies will be very materially decreased. See that all fruit sent to market during the month is carefully handled, properly graded, and well packed—not topped, but that the sample right through the case or lot is the same as that of the exposed surface.

GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Much of the matter contained under the heading of "The Coast Districts" applies equally to these parts of the State, as on the spring treatment that the orchard and vineyard receives the succeeding crop of fruit is very largely dependent. All orchards and vineyards must be kept in a state of perfect tilth, and no weed growth of any kind should be allowed. In the Western districts, irrigation should be given whenever necessary, but growers should not depend on irrigation alone, but should combine it with the thorough cultivation of the land so as to form and keep a fine soil mulch that will prevent surface evaporation.

All newly planted trees should be carefully looked after and only permitted to grow the branches required to form the future tree. All others should be removed as soon as they make their appearance. If there is any sign of woolly aphis, peach aphis, or scale insects, or of any fungus diseases on the young trees, these diseases should be dealt with at once by the use of such remedies as black leaf forty, Bordeaux mixture, or a weak oil emulsion. In older trees, similar pests should be systematically fought, as if kept in check at the beginning of the season the crop of fruit will not suffer to any appreciable extent. Where brown rot has been present in previous years, two or more sprayings with Bordeaux mixture can be tried, as they will tend to check other fungus growths, but at the same time the sodium or potassium sulphide sprays are more effectual for this particular disease and should be used in preference when the fruit is nearly full grown. All pear, apple, and quince trees should be sprayed with arsenate of lead—first when the blossom is falling, and at intervals of about three weeks. Spraying for codlin moth is compulsory in the fruit district of Stanthorpe, and wherever pomaceous fruits are grown it must be attended to if this insect is to be kept in check.

In the warmer parts a careful check should be kept for any appearance of the fruit fly, and, should it be found, every effort should be made to trap the mature insect and to gather and destroy any affected fruit. If this is done, there is a good chance of saving the earlier ripening summer fruits, if not the bulk of the crop. Tomato and potato crops will require spraying with Bordeaux mixture, as also will grape vines. Keep a very strict watch on all grape vines, and, if they have not already been treated, don't delay a day in spraying if any sign of an oil spot, the first indication of downy mildew, appears on the top surface of the leaf. Spraying with Bordeaux mixture at once, and following the first spraying up with subsequent sprayings, if necessary, will save the crop, but if this is not done and the season is favourable for the development of the particular fungus causing this disease, growers can rest assured that their grape crop won't take long to harvest.

Where new vineyards have been planted, spraying is also very necessary, as if this is not done the young leaves and growth are apt to be so badly affected that the plant dies.

Photo.: N. A. R. Pollock.]

PLATE 87.—A FINE CROP OF FIELD PEAS ON THE ATHERTON TABLELAND.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S., and A. K. CHAPMAN.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

1925.	September.		October.		Moonrise. Sept.	Moonrise. Oct.
Date.	Rises.	Sets.	Rises.	Sets.	Rises	Rises.
					p.m.	p.m.
1	6·7	5·37	5·33	5·51	3 51	4·49
2	6 6	5·38	5 32	5·52	4 58	5 52
3	6·5	5·38	5 31	5 52	6·4	6·51
4	6·4	5·39	5 30	5·53	7 8	7·52
5	6·3	5·39	5 29	5·53	8 10	8 49
6	6·2	5 40	5·28	5·54	9 9	9·46
7	6·1	5·40	5 27	5 54	10 8	10 42
8	6·0	5 41	5 25	5 55	11·4	11·35
9	5·58	5·41	5 24	5·55	11 59	nil
						a.m.
10	5·57	5·41	5 23	5·56	nil	12·24
					a.m.	
11	5·56	5·42	5·22	5·56	12·52	1·12
12	5 55	5·42	5·21	5·57	1 43	1 55
13	5·54	5·43	5·20	5·57	2·31	2·34
14	5 53	5 43	5·19	5·58	3·17	3 13
15	5 52	5·44	5 18	5·58	3 59	3 49
16	5 50	5 44	5·17	5·59	4·38	4·26
17	5·49	5·45	5·16	6·0	5·15	5·0
18	5·48	5·45	5 15	6·0	5 50	5 35
19	5·47	5·46	5·14	6·1	6·26	6·15
20	5·46	5 46	5·13	6·1	7 1	6 55
21	5·45	5·46	5·12	6·2	7·38	7·40
22	5 44	5·47	5·11	6 2	8·15	8·29
23	5·42	5·47	5·10	6·3	8·57	9·26
24	5·41	5·48	5·9	6·4	9·43	10·23
25	5·40	5·48	5·8	6·4	10·34	11 27
						p.m.
26	5 39	5·49	5·8	6·5	11·30	12·29
					p.m.	
27	5·38	5 49	5·7	6 6	12 31	1·32
28	5 37	5·50	5 6	6·6	1·34	2·35
29	5·36	5·50	5 5	6 7	2·39	3·38
30	5 34	5·51	5·4	6 8	3·45	4·37
31	...	...	5·3	6·9	..	5·36

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

3 Sept.	○	Full Moon	5 53 a.m.
10 ,,	☾	Last Quarter	10 12 a.m.
18 ,,	●	New Moon	2 12 p.m.
25 ,,	☽	First Quarter	9 51 p.m.

Perigee, 1st Sept. at 3 54 p.m.
Apogee, 13th ,, at 5 12 p.m.
Perigee, 29th ,, at 2 48 p.m.

On the 11th September Mercury will be at its greatest distance (about 18 degrees) west of the Sun, rising 44 minutes before the latter. Mars being in conjunction with the Sun on the 13th instant will not be observable during this month. On the 21st, at 3·44 p.m., Venus will apparently be at a distance equal to that of the length of the Southern Cross southwards of the Moon. This should form an interesting daylight spectacle, especially with the aid of a pair of binoculars; good eyes should, however, detect both objects without very much difficulty. Another interesting daylight spectacle will be afforded by Jupiter and the Moon on the 26th, between 5 and 6 p.m., when Jupiter may also be seen a little southward of the Moon without binoculars by persons of keen eyesight. About 8 o'clock on the same evening an occultation by the Moon of a third magnitude star in Saggitarius will occur in Queensland, but not as far South as Sydney.

2 Oct.	○	Full Moon	3 23 p.m.
10 ,,	☽	Last Quarter	4 34 a.m.
18 ,,	●	New Moon	4 6 a.m.
25 ,,	☾	First Quarter	4 38 a.m.

Apogee, 11th October at 11 12 a.m.
Perigee, 25th ,, at 10 24 p.m.

On 7th October Mercury will be in conjunction with the sun on the far side of its orbit and invisible until toward the end of the month. On the same day Jupiter will be in quadrature with the sun, and would therefore rise at midday were it not for its greater southern declination making it do so three-quarters of an hour earlier. As the planet Mercury will be in conjunction with the moon on the 18th, Saturn on the 19th, Venus on the 21st, and Jupiter on the 23rd it will be seen that these four planets will extend eastwards at no great distance from one another. Mercury will be apparently in the constellation Virgo, Saturn in Libra, Venus in Scorpio, and Jupiter in Sagittarius. These four planets will follow the sun down to the western horizon in the order shown, and with the exception of Mercury, which will be too near the sun to be visible, will form an interesting spectacle soon after sunset.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

A Cross in this space is a reminder that your Subscription to the Journal expires with this number.	

ANNUAL RATES OF SUBSCRIPTION.
Farmers, Graziers, Horticulturists, and Schools of Art FREE on prepayment of 1/- to cover postage. Members of Agricultural Societies, 5/-, including postage. General Public, 10/- including postage.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXIV. 1 OCTOBER, 1925. PART 4.

Event and Comment.

The Current Issue.

The new cover on the Journal will be appreciated by readers as a departure from the colder, official type hitherto in use. In the new design is typified our main agricultural industries, and with its warm maroon tints, Queensland's colour, it will be accepted as altogether pleasing. The completion of Sir Matthew Nathan's term with us as Governor is fittingly marked by a report of his valedictory address at Parliament House in the State Capital. His Excellency has favoured the Journal with a special farewell message to the farmers of Queensland, in which he shows again his regard for the men, women, and children of our great Bushland, together with an appreciation of their problems and their fine, straight Australianism. The importance of developing the State along sound lines and of paying particular attention to modern methods of marketing farm produce are dealt with by the Minister, Hon. W. Forgan Smith, in a notable second-reading speech on the Primary Products Pools Amendment Bill, which is also presented. Maize-growing on the Atherton Tableland and Northern potato trials are discussed by Mr. Pollock. Dairy fodder plots at Toogoolawah are the subject of interesting notes by Mr. Gibson. In response to numerous requests for information on coffee-growing in Queensland we have reprinted useful notes which appeared in an earlier issue. Mr. Shelton discusses this month, in addition to pig marketing, Yorkshire pigs and paralysis in the hindquarters of pigs. On the science side, Mr. Hardy, of the Queensland University, has a note on the fecundity of Mormoniella and some problems in parthenogenesis. The work of entomologists in connection with our sugar problems is described in copious accounts. Other matters of agricultural interest are also strongly featured, and the October number is sure to be appreciatively received.

The Farmer's Feathered Friends.

The folly that lies in the wanton destruction of Australian birds and the need for more stringent measures towards their preservation were stressed strongly by a Southern deputation recently. The importance from an economic point of view of native birds as insect exterminators is well known to every nature student, and thanks to the efforts of the Gould League of Bird Lovers, particularly among school children, some measure of protection has been afforded the farmer's feathered friends in Queensland. Greater effort is, unfortunately, needed to maintain an enlightened public opinion in this connection. Australian fauna has been described as the most interesting and most beautiful in the world by scientists of other countries. In spite of what has been done to curb the destructive tendencies of the unthinking and the juvenile, there is still evidence of great ruthlessness in this regard. Holiday shooters are particularly destructive, and bird nesters, who, besides taking eggs, often capture young birds during the breeding season, also take tremendous toll of native bird life. It is a sad fact that, even in areas set apart as sanctuaries, there is often very little respect for game laws and the rules of true sport. The trapper and the poisoner apparently give little thought to the immense economic losses that will inevitably follow the killing wholesalely and indiscriminately of our insectivorous birds. Foxes and domestic cats are also great offenders. A strong public opinion against indiscriminate destruction of native bird life is a need in every district, and every effort should be made, if only from a business standpoint, to create and sustain such a worthy public spirit.

Queensland Agriculture.

The annual report of the Department of Agriculture and Stock, which has been tabled in the Legislative Assembly, contains much valuable information on the position and condition of our rural industries. Though conditions climatically in the course of the year were conducive to good returns generally, the season was more favourable to the pastoralist than to the farmer. Excessive wetness in some districts and meagre rainfall in others affected production, but, all in all, harvests were bountiful and stock returns high. The season was so favourable to graziers that interest in fodder conservation was unwisely allowed to wane. This form of dry-time insurance is regarded as so important that no opportunity of emphasising the need for the practical application of this principle of ordinary common prudence should be missed.

Marketing.

The whole question of marketing is demanding more and closer attention. The necessity for common sense in production and good business sense in selling is becoming more clearly evident. The position of the maize-grower particularly was unsatisfactory. There was a big carry over from the previous season and prices were on a par with the cost of production. The need of efficient marketing organisation could not have been more strongly demonstrated than it was in connection with this crop. On the other hand, the existence of an established marketing organisation for wheat-growers—the Wheat Pool—on which farmers are directly represented, created a feeling of confidence in that industry that was not apparent in pre-pool days.

Experiment Work.

Wheat experiment work was carried on during the year with success. As the season was generally conducive to rust, certain selected strains were chosen for further propagation. Some of the more recently fixed strains show great promise. The system of wheat experimentation has, in view of the encouraging results from other plots, been extended to Inglewood, Pratten, Hermitage, Allora, Kaimkillenbun, Jandowae, Pittsworth, Southbrook, and Murgon.

Potatoes and Onions.

Not enough attention, says the report, is being given by Queensland farmers to the cultivation of English potatoes. In the aggregate farmers are losing heavily in their not supplying home requirements. Importations from other States, in view of our capacity to produce, in the main, good tubers, are altogether too large. The Department has made it a practice to introduce proved varieties from the South, test them in the field, and ensure that the better sorts are brought into cultivation. In the North a system of maintaining a continuity of seed supply between the Coastal and Tableland districts has been initiated. The necessity of importing Southern seed at heavy expense will thus be obviated. Onions is another crop to which farmers of this State do not give, apparently, enough attention, for large importations of this commodity are also necessary to meet the home demand.

The Fuel of the Future.

The necessity for creating sources of supply of power alcohol has directed attention to the possibilities of cassava, arrowroot, sweet potatoes, maize, and other suitable plants. Sufficient cuttings of cassava have been obtained from Java to plant 300 acres in the Mackay district, and arrangements have been made with the management of the Plane Creek Sugar Mill to treat the expected crops. A commercial crop of this nature should, as a supplement to other forms of production, be a strong factor in advancing agriculture north of the Tropic.

The Journal.

" 'The Queensland Agricultural Journal,' " continues the report, "has proved an excellent medium for bringing before the farmer the results of agricultural research. As a useful journal of record, current technical and practical information, it maintains a high standard both in respect to matter and its presentation. Results of experiments and notes on current agricultural problems and topics are regular features of its pages. In healthy and progressive agricultural development experimental work is essential, but if its results are not conveyed to the farmer in readable and digestible form its usefulness is greatly reduced. In this form of agricultural extension work the Journal has succeeded, and generally its value as a vehicle of agricultural information is highly appreciated."

Plate 88.

The Right Honourable Sir Matthew Nathan, G.C.M.G., P.C., LL.D., Governor of Queensland, 1920–1925.

[Special to the "Queensland Agricultural Journal."]

GOVERNMENT HOUSE,
BRISBANE,

3rd September, 1925.

MESSAGE TO THE FARMERS OF QUEENSLAND.

A large part of the happiness I have had in Australia has been when in company with the farmers—at close on a hundred shows, on many a dairy farm from Atherton to Lismore, on sugar farms from Cairns to Tweed Heads, on fruit farms on the North Coast Line and in the Granite Belt, and on mixed farms on the Downs and dotted all over the Eastern districts of Queensland. I have learnt to understand the hardships of the farmers' life—its anxieties and its discouragements—and also its compensations. I have seen successes brought about by hard well-planned work and skilful modern methods and by love of an occupation which means close contact in the open air with the wholesome earth and the beasts and plants that live on it; and I have seen also failures due to the lack of these things as well as to ill-fortune, which was no man's fault. I have learnt here, as I learnt in Ireland, the great increase in the proportion of successes to failures that comes from co-operative methods, and I have further seen here the gain in the amenities of life that comes from the friendly association of farmers' wives and daughters for their common interests. I have observed the advantages as regards health and strength that men, women, and children who live on farms have over those who live in streets, and I have enjoyed the straight and sane views expressed in many talks I have had with farmers. I thank all those that I have come across for the cheery reception that they have always given to me, and I wish them and all the farmers of Queensland good seasons and good markets, bringing prosperity and happiness to them and to their families through a long future.

Matthew Nathan

A GREAT GOVERNOR.

VALEDICTORY TO SIR MATTHEW NATHAN.

The completion of Sir Matthew Nathan's term as Governor of Queensland is regarded with a regret, both genuine and general, by the people of this State. So great a part has he filled in our social life, so deeply has he concerned himself with our everyday bread and butter problems, and so practically sympathetic has he been with our efforts to become articulate in art, literature, and the other things that make life worth while, that it had almost become a habit to think of him as a good and big Australian—one who would continue to exercise a fine influence on our social conditions and institutions, rather than one whose stay amongst us was limited to an all too short a term as the representative of the Imperial Government.—Ed.

OFFICIAL FAREWELL FUNCTION.

On 16th September, the eve of his departure from Brisbane, His Excellency was entertained by the Government at dinner at Parliament House.

SPEECH BY THE PREMIER.

The toast, "His Excellency the Governor," was proposed by the Premier (Hon. W. N. Gillies), who said that it seemed but yesterday when they listened to the Governor's first public utterances in this State on the day of his arrival. During the course of his speech he made reference to the extensive knowledge that his predecessors possessed regarding the important subject of agriculture, and he modestly expressed some misgivings on that point regarding himself. He (Mr. Gillies) was not a little disappointed at the time on hearing Sir Matthew's confession. It was not long, however, before he learned, in conversation and by speeches, that not only did the Governor appreciate the importance of agriculture and stock raising, but the advice tendered by him was of so sound and practical a nature as to indicate a close and lengthy study of the many aspects of agriculture and the problems of the man on the land. It was soon apparent that the Imperial Government had made a wise choice in selecting for the position of Governor of this State a gentleman so ripe with experience in the administrative and pro-consular spheres of the Imperial service, and so richly endowed with all the qualifications that were essentially required in such a high and important position.

Sir Matthew Nathan had now had an official career of some forty-five years—the first ten years of which he spent in military service, the next decade at the War Office, and the next ten years as Administrator of Crown Colonies; a further period of ten years was devoted to high public positions in the old country; and the last five years had been spent in Queensland. These last five years had not been the least fruitful and beneficial to the people.

"We have met, therefore," said Mr. Gillies, addressing His Excellency, "on the eve of your departure, to express in a few words our great admiration of your personal attributes, respect for your high intellectual attainments, and our sincere appreciation of the magnificent service you have rendered to the State of Queensland and to the British Empire during your five years' service as His Majesty's representative here. On all questions associated with the progress of the State, well-being, comfort, health, and happiness of the people, you have always tendered sound advice and given words of encouragement and inspiration. Your intellectual force of character has constituted you a guide, philosopher, and friend in every branch of our State-wide activities; your simple devotion to duty, your great personal charm, your kindly interest in the welfare of our citizens, and above all your

love for the children of the city, the town, and the bush, have implanted in the hearts of the people of this State a feeling of affection that will never be effaced.''

Mr. Gillies added that the Governor's relations with his Ministerial advisers had always been harmonious and friendly. On the other hand, the matured and well-considered advice of His Excellency had always been available to the Government and the people of Queensland, and such advice had been tendered without obtrusion in any shape or form.

The Leader of the Opposition.

Supporting the toast, the leader of the Opposition (Mr. A. E. Moore) said that the occasion was a unique one, and the only one on which the Government and the Opposition could come together in complete agreement. They all deeply and sincerely regretted the departure of His Excellency, for they all recognised the wonderful and self-sacrificing work which he had done. Sir Matthew Nathan had travelled throughout the State to ascertain for himself how the people were living, and his words of encouragement and hope would long be remembered. Sir Matthew had the peculiar faculty of winnowing the grains of knowledge from the great amount of chaff brought before him on his travels, and he would be able to speak in England of the requirements of this State; in fact, the influence which he could wield on the other side would be greater than the influence which he had wielded here, and he (Mr. Moore) was sure that Sir Matthew Nathan would endeavour as much as was in his power to further the interests of this State.

Mr. Moore concluded by saying that he was not voicing a platitude when he said that the Governor had won the very sincere respect and admiration of the people of Queensland.

The Deputy Premier.

The Deputy Premier (Mr. W. McCormack) said that throughout his term of office Sir Matthew Nathan had understood his position perfectly, and had carried it out faithfully. But his chief claim to the people's affection had been his social activities. He would be long remembered, not as a good Governor, but as the man —Sir Matthew Nathan—who went from one end of the State to the other giving help and advice to the people of Queensland. He had endeavoured to lead the people to an appreciation of the beautiful and the good. He had endeavoured to divert them from the all-pervading materialism which had the world by the throat, and had pointed out that more attention should be given to art and education.

''Sir Matthew Nathan,'' said Mr. McCormack, ''represents the true type of English gentleman, a man who stands for honour and integrity. These men are needed to-day. Australia needs people, and if His Excellency tells the people in England that Australia is an empty land of wonderful opportunity for men with a will to work and win he will have done the State great service.''

The leader of the National party, Mr. Charles Taylor, M.L.A., said that the Governor's services to Queensland were appreciated from Cape York to the Tweed.

THE GOVERNOR'S REPLY.

His Excellency, on rising to respond to the toast in his honour, was cheered to the echo, and was unable to proceed with his speech until the tumult of acclamation had subsided. He (Sir Matthew Nathan) did not claim that his years of office had been filled with too strenuous work or burdened with any heavy responsibility. As Mr. Gillies had pointed out in public utterances, the official duties of the Governor were not arduous, and were within any ordinary capacity. Except on very rare occasions when it was for him to take the initiative in getting the decision of the people whether his advisers did or did not represent them (and no such occasion had, he was glad to say, occurred in his time) his official duties carried little responsibility except for the information he might give the King's Ministers at the centre of the Empire. Nor were the Governor's unofficial duties of a responsible nature. The extent to which they might be arduous depended entirely on the views he took of them. He held that they could not be effectively carried out unless he devoted

to them his whole time and energy. They required that he should get to know the conditions of all parts of the country and the interests of all sections of the people, and that he should devote the knowledge and influence so acquired to the improvement of those conditions and the promotion of those interests. That had been the aim of his travels, his inquiries, and such advice as he might have given when he had been asked to speak on a thousand or more public occasions, and when he had attended hundreds of meetings at which matters of town and country, of social well-being and philanthropic assistance, of educational development and cultural advancement, had been discussed. Whether activity in these directions had had any effect he frankly could not say, and must leave to others to judge.

The Work of the Department of Agriculture and Stock.

"I may have converted a few to the belief that immigration is necessary for the safety of the country and not necessarily inimical to the interests of its workers," continued His Excellency. "Advocacy at a hundred shows of raising average production from land and stock, through improved cultivation, conservation of fodder, herd testing and purer breeding, may have emphasised the recommendations in these directions of the Agricultural Department, whose assistance to me in informing myself in these matters I am glad now to acknowledge. I am glad also to think that that department is likely to extend the area of its research to those tropical parts of the country where there is now no cultivation, but where agricultural possibilities exist and the need for population is greatest. As regards another form of cultivation, I am gratified at leaving behind me a well-established Forestry Association which will keep the people at large interested in, and will not allow the Department of Lands to neglect, the duty of this generation to prevent splendid Queensland timbers becoming extinct and future generations being without the supply of that most important raw material—wood for building and other purposes. I would follow my mention of the Lands Department by an expression of gratification at my name having been, at the instance of the late Premier, associated with the splendid scheme by which 200,000 acres of irrigated land are eventually to be given to the country. While I regret that I have not seen the foundations laid of the great dam which is to hold back over 2,000,000 acre feet of water, I am glad at any rate to understand that work on them is very shortly to be put in hand.

Welfare of Country People.

"The opening of many buildings, mainly those for public services of one sort or another, has been among my formal duties, requiring no capacity and involving no responsibility but at the same time yielding much satisfaction. Particularly I have in mind the opening of a number of those maternity wards that constitute so conspicuous a claim of the Government on the gratitude of the country people. That provision has been a great work of the Home Office, and it only requires the Home Secretary to make a personal inspection of the bulk of the wards to remedy a few matters which will be brought to his notice or would come under his penetrating observation. I feel sure that on that occasion he will consider the need for some system of providing at the hospitals in the remoter parts of the State, for which the State has any responsibility, young medical officers of the highest qualifications and sufficient experience, of retaining them at these hospitals for a fixed number of years, and of ensuring them subsequent opportunities for a bigger practice under more favourable conditions.

"Continuing with regard to the long list of matters that have interested me, but which I may not say have been advanced by any action of mine, I cannot claim success for my advocacy of detailed study and experiment, both as regards design, materials, and location, to arrive at the best form of residence for the settler in the tropics unless the attention that is now being paid to the general question of design for cheap houses by the Town Planning Association is a result of that advocacy. I naturally rejoice to have been connected with that association that has made town planning a live matter at the critical time of the creation of Greater Brisbane.

The Queensland University.

"Passing from the material to the intellectual sphere, I would express once more my gratitude to the Government for having made me a member of the Senate of the University of Queensland, and to the Senate for having elected me to be its Chancellor and for conferring on me later a degree which will make my association with the University a permanent one and enable me to represent it, and I hope assist it, when on the other side. It is the custom to call the University the coping stone of the educational system of the State. I look on it rather as the foundation. It creates knowledge by research and sets the standard of knowledge for the schools. To assist the Senate in these high purposes there should be, in my opinion, a permanent Vice-Chancellor having no other duties to perform than to think out projects of research and schemes of instruction. It is not necessary to add that he should be the best man obtainable in the State, with full knowledge of the State's educational system and of high intellectual qualifications. Mr. Gillies knows my views as to this, but will, I am sure, pardon me for making reference to them on this occasion that he has so kindly afforded me. He will also forgive my expressing disappointment at not having witnessed the beginning of the construction of new University buildings on the site provided by the legislation of three years ago. Of course these will be costly, but it is more costly still to reduce the efficiency of the University by cramped housing preventing its growth. It certainly is most regrettable that our Queensland boys and girls should have to go to Sydney for a medical degree. I am glad to think that a Faculty of Law has been established in my time, and that one of Agriculture will shortly be added. It pleases me also to realise that the value of the Women's College of the University, which makes possible to women whose homes are in the country the best education that the State can offer, has become better known and more appreciated in these last years.

Barrier Reef Investigation.

"One movement started in my time, with which the University has been closely associated, owes considerable assistance to the Chief Secretary's and to the Treasurer's Departments of the Queensland Government, as well as to other Universities of Australia and to certain private persons—I refer to the investigation of the Great Barrier Reef. There are funds to enable this work in which Australian, British, and American scientists are taking keen interest to go on for another two or three years. I had been in hopes that some generous citizen or citizens would make a donation of the £20,000 necessary to endow a Chair of Marine Biology which would lead to a similar study here of the life of the Western Pacific as is being carried on by the Scripps Institute in California as regards the eastern part of the ocean. I am looking forward to visiting presently that institute on my way home, and subsequently to enhancing the interest in the problems of our Great Barrier Reef that is being taken by scientific institutions in Great Britain.

Technical Education.

"I can lay no claim to have assisted though I have been greatly interested in the extension of Queensland technical education in these last years. The Government of its own initiative has taken over and improved some of the technical colleges and created a number of rural schools, teaching certain technical subjects to boys and girls going on to the land. I was greatly impressed by seeing a week ago on the veranda of what was little better than a bush hut, on the Binjour Plateau, between Gayndah and Mundubbera, a class of girls receiving free instruction in useful dressmaking and millinery. It is the constant effort of the Government to give the bush children the educational advantages of those that live in the great cities, and though this will never be completely possible much is being done. I have been told and I readily believe that the Queensland system of education is the best in Australia. There remains to be initiated that most important of all educational advances which we have heard is in contemplation—viz., the raising of the general school leaving age to sixteen. This will be a difficult matter to work out, especially as regards the exemptions that will be necessary, but our Department of Public Instruction is equal to the task.

Australian Literature.

"I wish that Department would take steps to see that the State got a better return for its expenditure on encouraging adult reading. A large proportion of the 220 Schools of Arts libraries, housing 425,000 volumes, are not doing what might be expected of them—viz., supplying that demand for reading matter which the activities of the Bush Book Club show to exist. Apart from a general improvement in the supervision and work of these libraries, there is one feature that has been introduced at my instance in some of them and I should like to see common to all, and that is the setting apart of prominent shelves to contain books on Australia or by Australian writers. Pride in the continent which is now theirs, in the deeds of those that have inhabited it for the last century and a-half, and in the literary work of writers who are fellow citizens, would be inculcated in this way. That we are in the early days of Australian history should make us also keen on preserving the history of those days while this is still possible, and I greatly hope that the gazetteer giving the origin of Queensland place names, on which it has been a pleasure to me to spend many night hours in the past years, may be pushed on to complete publication by those who have laboured with me in the matter and may lead to further collection of old-day records. For the Historical Society of Queensland which honoured me by making me its patron, the Queensland Branch of the Royal Geographical Society of Australasia of which I have attempted to be a not inactive president, for the Royal Society and the various other scientific bodies as well as for those having as their object the advancement of literature, art, music, and horticulture, with which I have now with all regret to sever my more active connection, I bespeak the continued interest of an enlightened Government, of municipal bodies which in other lands I know help in these matters, and of a people with whom I hope and believe intellectual enjoyment is becoming a greater element of recreation as time goes on.

Boy Scouts and Girl Guides.

"Reverting to the instruction of youth, I would say a final word with regard to two movements which concern themselves mainly and I believe effectively with the training of character—the Boy Scouts and the Girl Guides. I speak of them as the most important representatives of other bodies which have somewhat similar objects. They teach self-discipline, unselfishness, and the duty of helping others, and they teach also the boys and girls by play to become efficient in giving that help. The movements have not grown in the last five years to the extent I had hoped they would. With nearly 3,000 Boy Scouts there are about half and with nearly 1,000 Girl Guides about a third of the numbers I had looked forward to see this year, but the associations are very much stronger than they were in 1920, not only in numbers but also in the approach of members to the right spirit of scouting and guiding. They are, I am satisfied, doing good work for the State in the inculcation of good feeling among its citizens.

Country Women's Association.

"That also I hope will be one result of the rapidly growing Country Women's Association of Queensland. It is bringing women together with the sole qualification of their common womanhood, and the sole object of improving the conditions of life for women and children in the country. At their instance increased railway facilities for seaside visiting have been afforded; and additional educational provisions have been brought under consideration; through their efforts a chain of seaside homes from Townsville to Wynnum is being provided, rest homes for women coming in from the stations and farms are being created in many country towns, hospitals and other institutions all over the country by which women and children benefit are receiving financial and other assistance, and individual cases of distress are being quietly and effectively assisted. It is, however, from these useful activities bringing women of all occupations and positions into friendly co-operation, and thus adding to their friendliness among themselves and so to the unity of the community, that I look for the greatest effect from the Country Women's Association.

The Light of a New Day.

"In these days every movement tending to active thoughtfulness for others in the community and to unity of the whole is of moment. Conditions in the country at this time I am leaving it are such as to sadden any lover of it—to sadden but by no means to make despair. There is, I believe, better feeling in the land than recent outward manifestations have shown. Possibly the very large extent to which I have made use of the railways of the State and the fact that on a half dozen or more occasions I have met railway men at their invitation on other than their transport business, have made me feel that I know the men of this occupation better than those of most others. From the kindliness they have always manifested to me, who, after all, have been the head of the Government and the representative of law and order, and from the things I have heard and read of their general action, I am convinced that the vast majority as represented by their trade unions only desire to have what the community equally desire to give—the best conditions consistent with their not taking any more from the community's wealth than they supply to it. Of course it would be foolish to deny the existence of a minority in this and other industries, in this and in other countries—some perfectly honest and a few not ignorant—who believe that the economic basis of society is wrong and can only be altered by a war between classes. But war, I am sure, is the last thing that the splendid men I have met all over Queensland or the equally splendid women who influence them desire. Recognising that such a way would bring here, as it has brought elsewhere, the greatest misery to the greatest number, these men and women believe, as I believe, in every opportunity being taken to remove causes for ill-feeling, to assuage sectarian and political differences, and to amalgamate classes so that in the end all classes will be one. Presently this conviction will clothe itself with the force required to make it effective. Behind the dark cloud that has lowered over the land on the eve of my departure I foresee the light of a new day ready to burst forth—a day of differences lessened and of feeling bettered and consequently of greater peace and prosperity in Queensland and Australia."

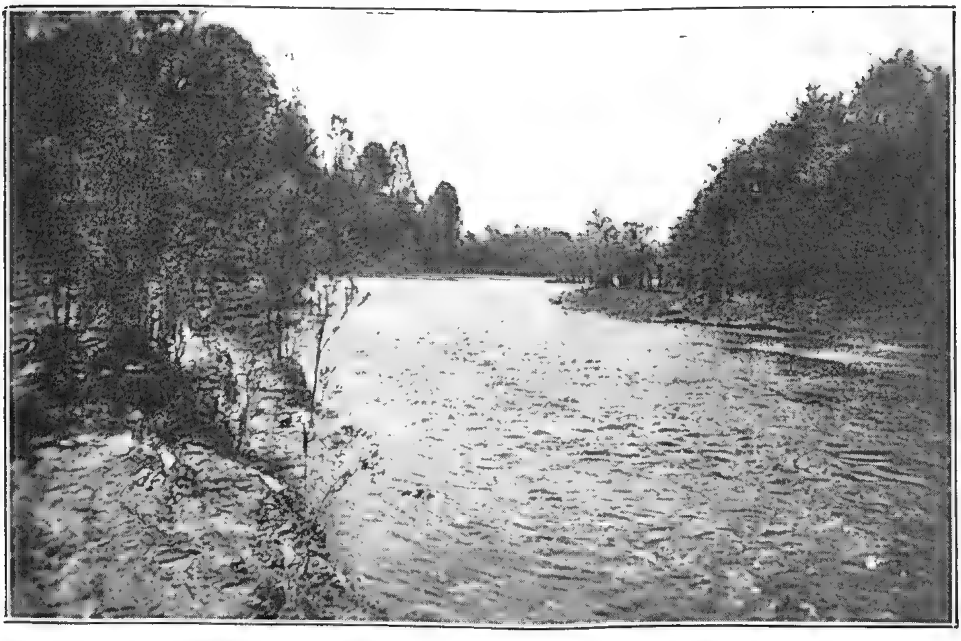


Photo.: O. A. Jones.

Plate 89.—The Beauty of the Upper Brisbane.

Bureau of Sugar Experiment Stations.

INVESTIGATION OF PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received from the Acting Entomologists at Meringa (Messrs. Burns and Mungomery) the following report dated 17th September, 1925:—

Notes on Cane Grubs and Beetles.

Although a few grubs of the greyback cockchafer (*Lepidoderma albohirtum* Waterhouse) have been ploughed up during the last month at Banna, most of these have assumed the quiescent state prior to pupation, and in the majority of cases noted elsewhere during this period, large numbers of pupae and beetles have been found in their underground chambers, or unearthed in the course of general farming operations.

Should soaking rains supervene in October and November, an early and large emergence and flight of beetles will take place, judging by the number of grubs which were present under the cane stools during the first part of this year. In this case farmers will then have a good opportunity of fumigating before the wet season commences, soils which are known to be grub-infested each year.

Army Worms Feeding on Cane and some of their Parasites.

The larvæ of two species of "Noctuid" moths, namely, *Cirphis unipuncta* Haw. and *Cirphis loreyi* Dup., are destructive to the leaves and young shoots of sugar-cane in Queensland; both of these species of moths belonging to the well-known "army worms." In addition to causing damage to cane in Queensland, *C. unipuncta* is found damaging cane leaves in Java, Mauritius, India, and the United States of America; and *C. loreyi* in India, Ceylon, Burma, Fiji, Java, and Mauritius. Besides attacking sugar-cane in other countries, the larvæ of both these *Cirphis* moths do extensive damage to corn, wheat, oats, rye, barley, and many other cereal and fodder grass crops.

The damage caused by the larvæ of these moths is confined to the leaves and young shoots of the cane plants, especially when the cane is from one to two feet high. When these pests occur plentifully in a cane field, it is only a matter of a few days before all the leaves and midribs, and even the stems themselves, are eaten down to the level of the ground.

These larvæ feed mostly at night, sheltering during the day in curled leaves, within the central whorl of the plants, and under clods of earth or débris surrounding the plants.

Cirphis unipuncta is generally regarded as being the more abundant of the two species; the other, *Cirphis loreyi*, being more local in districts where it occurs, and being comparatively late in certain seasons in comparison with its congener. Contrary to the usual course of events, *C. loreyi* appears to be the predominating species so far this season in Northern cane-fields, for out of large numbers of the larvæ of both these insects collected during the past month at Daradgee, Highleigh, Hambledon, and Gordonvale, the majority that emerged as perfect moths were *C. loreyi*.

The general appearance of the larvæ of these two moths is very similiar; when fully grown they measure 1¼ to 1½ inches in length, and individuals of the same species are extremely variable in colour. The colour of the larva of *C. loreyi* is ordinarily pale straw coloured, with dark brown longitudinal lines, whilst that of *C. unipuncta* is generally smoky brown or dark greenish-brown with black longitudinal irregular lines. The metamorphosis from larva to pupa takes place in the soil, about two or three inches below the surface. The period occupied in this condition is from two to three weeks according to the season of the year, development being much more rapid during the summer months. The moths themselves are quite distinct from each other. *C. unpuncta* if anything is the larger of the two species, and measures from 1½ to 1⅞ inches across the expanded wings. Its forewings are fawn coloured, sometimes suffused with grey or pink, and the hindwings are dark grey with the veins black. When viewed in certain lights the hindwings possess an opalescent tint. *C. loreyi* measures about 1½ inches across the open wings; its forewings are dark greyish-brown with small black spots, whilst the hindwings are hyaline white with a pink opalescence. A complete description of this species was given by Mr. E. Jarvis in 1920 (Bulletin No. 9 of this Experiment Station).

Five distinct parasites have been bred from the larval stage of these two species of *Cirphis*. The parasites—two species of *Tachinid* flies (undertermined) a small *Chalcid* wasp (undetermined) a small black *Braconid* wasp (undetermined), and a large species of *Ichneumon* wasp (*Henicospilus skeltoni*, Kir.)—exert considerable control over the natural increase of these two army worms. Representatives of the above parasites have been emerging at intervals during the past few weeks.

Beetle Borer Control and Liberation of Tachinid Flies.

Further liberations of tachinid flies (*Ceromasia sphenophori* Vill.) parasites of the beetle borer (*Rhabdocnemis obscurus* Boisd.) were made at Meerawa, Babinda, and South Johnstone. On the farms in the two former places where these flies were liberated, the borer infestation was moderate; however, it was found that the damage through the borer pest in the South Johnstone district was of a more serious nature.

The increase in this district during the last year is the result, chiefly, of the extensive fields of unpermitted cane which have been left to stand over from year to year. Canes in such fields, after a prolonged period of growth, invariably have a tendency to lie down, and later, the older sticks, under excessive moisture conditions, begin to rot. This state of affairs, coupled with injuries caused by rats, makes an excellent breeding ground for the beetle borer, and in places where its natural enemy, the tachinid fly, has not yet become established, the borer breeds unchecked and increases in enormous numbers.

In one instance, a field had accidently burnt out in the previous season, and owing to a fall in the density, and burning penalties making the harvesting unprofitable, portion of the burnt cane was allowed to remain on the fields in the hopes of getting a good ratoon crop in the following year. This practice proved to be abortive, for the burnt and fermenting sticks of cane not only attracted the borer beetles, but also provided very suitable food for their larvæ, which, on reaching the adult stage, reinfested the ratoons as soon as they began to make cane.

Another by no means unimportant factor in the borer control would be a more regular system of picking up the cane which often falls from the cane trucks in the course of transportation from the field to the mill. It can easily be understood how borer cane under such circumstances plays a big part in spreading the pest in clean areas bordering main tramlines. Of course we fully appreciate the difficulties that are to be met with in hauling cane over a long distance in scattered areas, and under such conditions some cane is bound to fall from the trucks; however, where badly infested cane is known to have fallen off, it should be gathered up immediately and sent to the mill for crushing or else burnt on the spot to help prevent the spread of the pest.

Farmers would be well advised to supervise personally the selection of plants, and not allow the responsibility to fall on employees, who very often recognise the borer as something that is to be with us for all time, and who take no pains to exclude it from the seed cane. Also the system much in vogue in this district, of taking whole lengths of canes, placing them in drills, and cutting the plans *in situ* with a cane knife while walking along the drill, is to be condemned, because thus a strict and proper inspection of plants is not practicable. It was found that areas where the tachinid flies were previously active, had, in some cases, been burnt off. On the other hand, these areas should be protected and isolated from fires which too often wipe out these friendly agents. It is encouraging to report that several empty puparia were found in borer cocoons in the field, and living specimens of the adults were actually bred out from puparia collected at South Johnstone, showing that these flies are established in various parts of the district. More flies will be liberated at later dates in parts where the borer depredations are heaviest.

Cane Leaf Mid-Rib Moth Borer.

This is a cane pest of minor importance, though evidence of its work may frequently be observed by the presence of reddish-coloured tunnellings in the interiors of the mid-ribs of cane leaves.

It is whilst in the larval stage that the damage is done by this species. The larvæ may be found by cutting open "tunnelled midribs." They are, when fully grown, a little over quarter of an inch long, light yellow in colour. The mandibles are brown. The transformation from larvæ to pupa takes place within the tunnels; the moth, when emerging, escaping through the epidermis of the midrib which has been previously partly eaten through and formed into an easily opened exit by the larva prior to pupation. The pupal period lasts about one month at this time of year.

The moth measures approximately ⅜ of an inch across the expanded wings, and is coloured as follows:—Forewings near body and tips of same, also whole of hindwings, grey; median area of forewings, golden-yellow marked with minute silvery

spots. Wings fringed with fine cilia or hairs, which, in the hindwings, are longer than the width of the wing itself at its widest part.

In breeding experiments at the Laboratory, one parasite so far has been bred from larvæ of *Cosmopteryx* in the form of a small *Braconid* wasp.

Fortunately, the damage caused by this species does not injure cane plants to such extent as to warrant control measures.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (22nd September, 1925) upon diseases and pests from Mr. W. Cottrell-Dormer:—

Gumming Disease.

As has already been mentioned in my last month's report the presence of Gumming disease in the Aloomba locality has been confirmed, and measures are being taken to prevent its spread to other parts. Careful inspections of all fields within about 1¼ miles of fields found to be actually infected have been continued, but no sign of the disease has been detected outside the area declared infected in my last report. The boundaries of this area, as then stated, were the main Babinda road from the Behana Creek Bridge to the crossing of the Mulgrave River at Aloomba on the west, the Mulgrave River on the north and east, and the Behana Creek on the south; however, since last reporting, the disease has been detected on two fields adjoining Behana Creek, so the latter should now be considered as being within the infected area. It must again be emphasised that this area should be regarded as a quarantined area, meaning that no plants *whatever* are to be taken from it to other localities. On Sunday, 23rd August, a meeting was held on a gum-infected farm where the situation was clearly put before the growers, and some instructions given in the detection of the disease; however, as only about thirty growers turned up to this meeting, more is needed to make the farmers realise that with proper precautions they stand a very fair chance of checking and possibly later eradicating this most serious disease of sugar-cane. A circular dealing with this disease and its control is, therefore, in accordance with instructions, in course of preparation, awaiting which, growers should bear in mind the following salient features of proposed measures of control:—(1) Plant only healthy cane. Growers who at any time have received plants from Aloomba, Herbert River, or any other gum-infected centre should at once notify the Officer in Charge at Meringa, so that their cane can be inspected before being used for plants, as I understand that the officer of this station who was instructed to assist growers in seed selection is now prepared to carry on with this work. (2) Plant only resistant varieties in the infected area; these varieties include Badila, B. 147, and Q. 813, and growers should remember that the word "resistant" is not synonymous with the word "immune," as a resistant cane will sometimes contract the disease to a light extent, and a cane which is resistant to gum in well-drained land will often prove very susceptible in badly-drained soil under very adverse conditions, whereas an immune cane will not contract the disease under any circumstances. (3) No cane whatever should be taken from the infected area to other parts, not even resistant canes, for the reason just explained, that a resistant cane will sometimes contract the disease to a slight extent. (4) Since B. 147 is very susceptible to Leaf Stripe disease, and this disease has not recently been seen in the district, the practice of introducing canes from other districts, without previous examination by someone competent in disease diagnosis, is very much to be discouraged on account of the danger of introducing fresh complications into the present situation at Aloomba.

Leaf Scald.

This disease would appear to be present mostly in the "wilting stage" just now, and as so many stools have been killed by grubs in most parts where the disease is present to any extent, it is sometimes difficult to gauge the damage actually caused by the disease. However, it can be safely said that rather severe damage has been suffered in some fields. The varieties most affected in these areas are Clarke's Seedling, Pompey, N.G. 24B, H. 109, and Badila. In the case of H.Q. 426, 7 R. 428, and H. 109, death to the stool, at this time of the year, seems to come very suddenly indeed, and very often the side shoots which are so generally characteristic of Leaf Scald are not formed at all, even at the base of the stool. The disease is also very prevalent in other localities, but since D. 1135 and Badila are the staple varieties there, the actual damage suffered is not so great. Leaf Scald was not observed at Hambledon and Sawmill Pocket, so that since H.Q. 426 and 7 R. 428 are both very popular varieties in these parts, every care should be taken by growers against its introduction.

FIELD REPORTS.

The Southern Field Assistant, Mr. J. C. Murray, reports under date 18th September, 1925:—

Barolin.

Cutting is proceeding smoothly. The cane is fairly heavy per acre, though the sugar content is not high. Good drainage on the farms would ensure a higher sugar content during the early cutting period.

Varieties doing well on the Barolin areas are H.Q. 285, E.K. 28, M. 1900 Seedling, H. 227, and Q. 1098. E.K. 28 (Java) is rapidly finding favour with the growers. It is a good stooling, free trashing cane, of fairly high sugar content, and is improving with acclimatisation.

Rubyana.

Cane is cutting well in this locality. The c.c.s. of D. 1135 is not as high as last year, although the H.Q. 285 is, if anything, a little better. Farmers are extending their areas of the latter cane. Other varieties doing well are Q. 970, H. 227, M. 1900 Seedling, Q. 813, E.K. 28, and Q. 1098. In fact the majority of the Queensland seedlings are improving.

The cane cut is not ratooning vigorously, particularly the M. 1900 Seedling. It was noticed in one paddock where the trash had been burned on and around the cut stools, that a fungus was attacking the cut surface of the cane and affecting the shoots.

Oakwood.

Harvesting here is in full swing. The cane is giving a fair tonnage per acre with a c.c.s. content ranging from 12 to 14.5. A number of farmers are busy with planting operations, and the use of fertiliser is fairly general. Growers find that complete fertiliser with a predominance of phosphoric acid gives the best results in the Oakwood soil, although few of the growers do much of that very important soil-building, the growing of leguminous crops for green manure.

Tantitha.

Cane crops here could be described as very heavy, particularly the M. 1900 Seedling and D. 1135. The sugar content of the latter cane is at present low. H.Q. 285, however, has given the growers very satisfactory returns. More of this cane is being planted. Other varieties doing well here are E.K. 28 and Q. 813. Growers are recommended to try the latter variety, experimentally at first, in place of D. 1135.

Bingera.

Cutting and hauling is in full swing in this district. M. 1900 Seedling and Black Innis are cutting well, although the growers are not recommended to plant the latter extensively. Black Innis is not resistant to disease and growers, with few exception, would be unwise to make this cane a staple variety.

Mullet Creek.

Long haulage in this district adds to the work of the growers. Good crops are being taken off this year, particularly from the scrub soils. This land may be generally classified as dark-grey sandy loam, red sandy loam, and red forest soil, typical of that which prevails in the Bundaberg district. Agricultural analyses show the soil generally to be low in humus and the three essential plant foods, potash, nitrogen, and phosphoric acid. Basaltic rocks are found in the substrata.

Varieties making a good showing are M. 1900, D. 1135, and Q. 813. Mosaic disease attack has lessened.

Gumming is widely distributed in the D.1135. Recommendations as to dealing with this disease were set out in last month's report. Some growers are under the impression that the causal agent of gumming has not been discovered. The disease is caused by bacteria (*Bacterium vascularum*), and can be eradicated if growers will follow the recommendations given by the Bureau.

The Northern Field Assistant (Mr. E. H. Osborn) reports (24th September, 1925):—

Cairns.

Weather conditions were showery. Total rainfall registered amounted to 72.14 inches. A very good crop of cane was being harvested, despite the losses from grubs and tonnage due to the backward state of late cut cane. Cutting cane after Christmas in the North is anything but conducive to good results, either from a miller's or grower's point of view.

In the Mulgrave area, Aloomba is light in tonnage, but this is more than compensated for by the excellent cane all through Highleigh, Riverstone, and along the river flats. Highleigh looked particularly green and had suffered very slightly from grub attack.

In the Hambledon area, Freshwater was not cutting such phenomenally heavy crops as last year, but against this the older land nearer the mill was yielding better crops than expected. What is gratifying to notice in the Cairns district generally is the improved cultivation that is being carried out, and any implement that promises efficient work is readily used.

A fair amount of planting has been carried out, but the strike generally has only been a medium one, probably on account of continuous wet in the early part of the year, and not enough sunshine, followed by a cold winter.

One of the best paddocks of young cane seen was some Badila at Green Hills. Nearby was a small plot of H.109 planted a little later. This had come through so slowly compared to the Badila that the expense of extra chipping would run into about another £3 per acre.

Mr. H. Freeman who is supervising the estate for the Colonial Sugar Refining Company, Limited, has just finished harvesting a 40-acre 15 months old crop of plant Badila, for a return of 45 tons per acre. This block had been green-manured only. Nearby, a block of second ratoons (N.G. 15) (fumigated) cut at the rate of 18 tons per acre, while check plots in the same paddock (unfumigated) were not worth cutting.

Varieties.—H.Q. 458 is becoming very popular in the Edge Hill area, some 60 odd tons of it having been sold for plants lately. Mr. G. T. Fleming has recently cut 48 tons per acre from a 10½ months old plant crop, after having manured with about 3 cwt. of mixed manure. His first ratoons, he considers, gave a return of about 50 tons per acre, but as they were a mixed lot, he cannot make a definite statement. This farm is so well cultivated that very good returns should always result.

H. 109.—A 15 months old crop of this cane at Green Hills looks green and healthy, and will probably cut a 35-ton crop.

B. 147 is gaining favour about the Mulgrave, for it generally gives a fair crop both for weight and density upon medium land.

H.Q. 426 (Clarke's Seedling) is developing so much Leaf Scald (and more lately in this area, Gum) that it is not as popular as formerly.

Green Goru (N.G. 24B) is so liable to Leaf Scald that it cannot be recommended. The following figures taken from one farm at Aloomba are interesting:—

Variety.	c.c.s.
H.Q. 426 (Clarke's Seedling)	17·2
Q. 813	16·4
Q. 813	13·8
E.K. 28	12·7
E.K. 1	12·3
H. 146	12·2
H. 109	12·1
M.Q. 1 (Mowbray Seedling)	10·7

It should be mentioned that all these varieties, with the exception of Q. 813 and H. 146, are affected with gum.

Pests.—Grubs are more in evidence than for several years, but it is probable that the total loss throughout the Cairns district will not be as severe as expected earlier in the year. On the low-lying cane areas rats have done more than their usual share of damage. Moth and weevil borers were noticed in several places, the loss from the former being more noticeable than generally at this time of the year.

Disease.—Leaf Scald did not seem to be nearly as prevalent in the district as formerly, and most growers are using great care in seed selection.

PRIMARY PRODUCTS POOLS.

MINISTER'S SPEECH ON AMENDING BILL.

When one considers the importance of developing our State along sound lines, one can readily be assured of the necessity of providing a suitable method of marketing our produce that will give the grower of that produce a decent livelihood in the State of which he is a citizen. . . .

A country's greatness depends on the energy and intelligence of its people, and it depends on the opportunities that are afforded the industrious worker to make a decent livelihood for his dependents. . . . .

No one desires to have any section of industry, agricultural or otherwise, carried on under a system that means sweating or underpayment of the men and women engaged in it.—*Hon. W. Forgan Smith.*

Following is the full text of the second reading speech by the Minister for Agriculture and Stock, Hon. W. Forgan Smith, taken from "Hansard," on the Primary Products Pools Act Amendment Bill:—

This is an amending Bill, the result of experience gained in the administration of the principal Act. The amendments are rendered necessary or desirable in the light of the experience we have gained since the inception of the measure. This legislation, while being of an experimental character in its inception, is of considerable advantage to the farming community, and, read in conjunction with other farms of agricultural legislation in this State, indicates that a genuine and definite desire has been evinced by the Legislature of Queensland to place the man on the land on a better footing than has been the case hitherto.

A Tribute to the Premier.

In that connection I take this opportunity of paying a tribute to my predecessor in this office, Mr. Gillies, who at all times utilised every endeavour to improve the conditions of the agriculturists in this State, and it is due very largely to his untiring energy that these measures which have been of advantage to the agriculturists have become law. The principle of pooling is one about which there can be little controversy, having regard to the best interests of agriculture in Queensland. There can be no doubt, of course, that, while we may be opposed on certain grounds from individual standpoints, when one considers the importance of agriculture to Queensland, and the importance of developing our State along sound lines, one can readily be assured of the necessity of providing a suitable method of marketing our produce that will give the grower of that produce a decent livelihood in the State of which he is a citizen. A country's greatness depends on the energy and intelligence of its people, and it depends on the opportunities that are afforded to the industrious worker to make a decent livelihood for himself and his dependants.

Business Methods and Farm Marketing.

The problem affecting agriculturists has been very well put by Mr. Herman Steen, in his work entitled, "Co-operative Marketing," in which he says—

> "The tremendous growth of co-operative marketing denotes an economic revolution of far-reaching consequences. It signalises the application of business methods to farm marketing, and the substitution of merchandising for the dumping that had characterised farm marketing since food products first entered the channels of commerce. Co-operative marketing rewards producers with improved prices and facilities in marketing, reduces materially the cost of marketing and distribution, and furnishes consumers with high-grade quality products often at lower prices; all this is amply demonstrated by the experience of leading American associations. Altogether it is the most hopeful existing movement for the permanence of American agriculture, and therefore of the nation."

Genesis of Pooling in Queensland.

During the war period in Australia efforts were made, and to a certain extent successfully, to pool available supplies of commodities with a view to protecting all the interests concerned, and, as a result of that success, this State has gone a great deal further than has been the case in any other country in the direction of providing

the legal machinery and the methods necessary for establishing pools for primary products. The interest that has been evinced in Australia indicates how successful the application of the principle has been. At the recent Conference of Ministers for Agriculture, at which there were present officers of the various agricultural departments throughout the Commonwealth, a very keen interest was displayed in the different forms of legislative activity regarding agriculture in this State and the success that has been achieved by various methods of co-operative credit.

In Western Australia and other States I understand proposals are being put forward along the lines on which Queensland has already legislated. It is interesting to note that both in the New South Wales and Victorian Press, particularly with regard to fruitgrowing, resolutions have been carried by representative farming associations for the purpose of securing powers similar to those which exist in Queensland. In America, also, interest along the same lines has been evinced; and it is of importance to know that practically every country dependent upon agriculture and realising the importance of agricultural production is thinking along those lines.

Hon. W. FORGAN SMITH,
Minister for Agriculture and Stock.

In that connection I have a rather interesting quotation from an American paper dealing with a conference held in Maine on 1st July last of various State Governors in America—

"Thomas G. McLeod, Governor of South Carolina, opened a discussion of farm problems with a speech on co-operative marketing. He advocated a selling organisation among the farmers, not to be maintained, but at least fostered by the State, so that agricultural products could be put on the market at a price ensuring a reasonable profit, instead of having them offered to the market by hundreds of thousands of small sellers in competition with each other.

"Co-operative marketing, by which the farm produce would be placed on the market only as the demand kept the price at what was considered a reasonable level, Mr. McLeod believed to be of vital importance in that it would make farming profitable and check the undesirable drift of population to the urban centres."

A Definite, Sound Economic Policy.

Prior to the enactment of measures of this kind the farming industry was practically the only large and important industry which was carried on on an individualist basis. In many instances farmers are expected to grow products without any regard for the demand for those commodities, and in many cases without controlling in any way whatever the final disposal of their products. We lay it down as a definite and sound economic principle that nobody has the right to get anything cheap if its cheapness depends upon the underpayment of anyone engaged in its production. That is our definite policy, and I am satisfied that the people of Australia are generally of the opinion that no one desires to have any section of industry, agricultural or otherwise, carried out under a system which means such sweating or underpayment of the men and women engaged in it; and, if we are going to make the conditions of the man engaged in agricultural production something more important than a subject for after-dinner speeches, then steps along the lines of this measure must be taken. The Hon. Henry C. Wallace, Secretary for Agriculture in the United States, put it in this way—

> "The farmer is the only large producer who produces without informing himself as to future demands; who sells at the price the buyer is willing to pay; who does not condition his products carefully for market; who dumps them in large quantities on the market soon after harvest, and who therefore pays high charges of all sorts to other people to do what he ought to do himself."

Farmers' Power under the Pools Act.

Under the Primary Products Pools Act and other pooling legislation of this Government machinery is placed in the hands of the farmer which will enable him to overcome the difficulties and organise in such a way as to improve his status and his position generally. Of course, I realise that in any community certain difficulties have to be overcome. There is the attitude of the man who takes the view that he should not be subject to any control, co-operative or otherwise; that he should be allowed to carry on his industry in his own way without regard to his fellows engaged in that or any other industry. That might be put forward as another specious argument against compulsory co-operative marketing; but we must realise that in any civilised community liberty is conditional on the liberty or the best interests of the people. Under our organised society men often have to give up what may be considered or may be defined as individual liberty with a view to sharing with the rest of the community that greater liberty which brings benefits to all. That is precisely the position in compulsory co-operative marketing. If the Australian agriculturist is to be put on a satisfactory footing, such marketing is essential; and my advice to the farmers of Queensland and of Australia generally is to get into the organisations provided for them under this and other Acts, take full advantage of them and loyally stick to their fellows, and so improve their position, paying little or no heed to interested parties who seek to break up their organisations with a view to maintaining that control which has been so profitable to them in the past, but which has resulted in disaster to the farmer as a class. By means of pooling, primary producers can organise their industry and so prevent waste, such as gluts, and eliminate unnecessary charges, and as a result reap a benefit for all parties concerned.

Stabilisation a First Advantage.

One of the first advantages of a pool is stabilisation. I contend that the stabilisation of the supply and price of a commodity is desirable in the interests of the community. Market fluctuations in the price or supply of a commodity are of little or no advantage to anyone in the community, and are detrimental to the interests both of the producer and consumer. What we should aim at is continuity of policy, and the stabilisation of markets and prices, ensuring to the producer a fair return for his labour and to the consumer an economic price based on the cost of production.

Principles of Co-operative Marketing.

There are certain principles of co-operative marketing which may be set out—

1. Co-operative marketing seeks to control the movement of commodities to market, thus substituting orderly marketing for after-harvest dumping;
2. It improves the quality of products through grading and processing, thus broadening the outlet;
3. It develops new markets through advertising and salesmanship;
4. It collects all available data bearing on future demand and advises its members so that they may individually adjust their production;
5. It reduces the usual high charges for marketing service by doing part or all of that work itself for its members at cost.

Every productive industry at the present time, therefore, is highly organised, and it is arrant hypocrisy for leader writers in daily papers like the "Telegraph" or any other paper to condemn organised production on the part of the farmers.

The Case Against and the Answer.

I noticed recently an article condemning the principle of pooling as proposed by this Government and by the organised farmers of Queensland. The attitude taken up was that the farmers had no right to organise in this way, and that it was detrimental to the public interests that those powers should be given. If the article meant anything, that was what it conveyed. At the present time every other industry is organised. The law of supply and demand is very largely controlled by means of combinations and understandings between those engaged in the various industries. Therefore I say it is the height of hypocrisy on the part of any one to object to the principles that we are laying down in this and other agricultural measures which are designed to confer the advantages of scientific organisation and control of marketing. Under the principal Act the following procedure is necessary to create a pool:—

1. Application by those interested is made to the Minister for a pool;
2. Notice of intention to create a pool is advertised;
3. It is within the right of any fifty producers interested to demand, within thirty days, a referendum;
4. If no demand for a referendum is received, the pool is constituted;
5. If a vote is demanded, voting-papers are sent to all producers concerned.

Under this Bill it is proposed to alter the percentage required for the approval of a pool. At present, if more than 25 per cent. of the producers who vote are opposed to a pool, then that pool cannot be formed. We have had experience of pools being prevented by a very small margin indeed, and under this measure it is proposed to alter the percentage basis from 75 per cent. to 66⅔ per cent., the reason for that change being that we as a Government and the agriculturists as organised bodies consider that 75 per cent. is too high a majority to require for the creation of a pool.

Pool Polls—Provision for Two-thirds Majority.

Some people have advocated that a simple majority of those voting should be sufficient, but on full consideration of the whole position I think it is desirable to place the percentage at the figure I have indicated. One must realise that, if there is very strong opposition among producers of a commodity to a pool, then the operations of that form of activity are likely to be circumscribed and unsuccessful. It is desirable that at least two-thirds should be in favour of the proposal, and by that means substantial support can be given to the proposal and continuity of policy secured. At the same time as the referendum on the pool is taken voting will also take place on the election of members for the pool board. The point was raised by the leader of the Opposition at the initiation stages of the Bill as to who shall be the voters. I replied by way of interjection that the producers of the commodity will be the voters under this Bill and under the consolidated Act. All those engaged in producing the commodity which it is proposed to pool will have a vote in saying whether there shall be such a pool.

The Dairy Farmers' Position.

The point has also been raised in connection with the butter pool as to whether the dairy farmers or the co-operative butter factories shall be the voters. The reply to that is that, in my opinion, both the dairy farmers concerned and the factories should be the constituents for such a pool. That is the provision and the power that is being taken under this Bill. In addition to that principle, in the existing law when a pool board is formed the Council of Agriculture recommend the chairman and appoint a representative to the pool board.

Reorganisation of Council of Agriculture.

It is necessary at this juncture to take into consideration with this measure the Primary Producers' Organisation Acts Amendment Bill which is on the business-paper, and it will then be understood that this Bill as well as that Bill provides for the reorganisation of the Council of Agriculture on a commodity basis. Commodity boards will be formed under section 3 of the principal Act, and they will function entirely in the industry covered by that organisation, the idea being to give complete control and autonomy to each industry organised on a commodity basis. Such a commodity board will from its members elect one representative to the Council of Agriculture, and they also will be given the power to elect their own chairman. That is to say,

from the elected members of the commodity board they will elect their own chairman and will also elect one of their representatives to the Council of Agriculture, which will then form a kind of executive representing the agricultural interests of the whole State. As a result of that, instead of the Council of Agriculture appointing a representative to these commodity boards, which, as I have pointed out, would be quite unnecessary, having regard to the method of reorganisation outlined, it is proposed to give the Minister power to elect a representative to those commodity boards which may be engaged in trading. The question has been raised in that connection as to how far we intend to go, and it will be necessary in Committee for me to move an amendment on that clause, setting out exactly what the intentions of the Government are in regard thereto. Commodity boards will be established which need not of necessity be trading boards. That is to say, in the constitution of a commodity board it may be provided that they shall have definite functions altogether apart from marketing. Their function will be then to organise their section of the agricultural industry and carry on activities in the interests of their members, but if a pool of that commodity is not formed, then there is little or no use in the Government appointing a representative to such a commodity board. Our representatives will be confined to those boards which have trading functions.

Government Representation.

Where a pool has been formed for any commodity, such as butter, cheese, eggs, maize, or anything else, the Secretary for Agriculture will be given the power to appoint a representative to that pool board to represent the public interests. I consider that desirable from the public point of view, as it gives stability to the principle of pooling itself, and is calculated to strengthen public favour in regard thereto.

It has been argued inferentially by certain people who have not considered the question fully, that the boards should be composed of primary producers, and that there should be no other persons on them than representatives of those engaged in the industry. The reply to that is that the public interests must be represented at all times. Where power is given by the State to effect practically a monopoly of a commodity, it is of advantage to have the public represented on such boards to ensure that the public interests are safeguarded. That is the justification for the Government having a representative on a pool board. We must remember that we are virtually the only country in the world giving the producers the machinery necessary to build up the complete and definite control of their commodity.

Continuity of Policy.

By the appointment of a representative of the public, nominated by the Secretary for Agriculture, a continuity of policy is ensured, and confidence is given to the public mind that the activities of these pool boards will always have due regard to the public interests. I have discussed this matter with a number of leading representatives of our industries who are now on pool boards, and representatives of producers' organisations, and they are in agreement with me as to the desirability of such action. In addition to that, it is the intention of the department to appoint to such boards a representative who will be able to help producers in carrying on their various forms of activity. A man will be appointed who has a knowledge of marketing conditions, and his services and advice will at all times be available to the producers. I was pointing out, when I was interrupted by certain hon. members, that I had discussed these matters with representatives of the different interests concerned, and they agree that it is desirable, having regard to all the interests concerned, to have such a representative, and it is the intention of the Department of Agriculture to appoint as their representative on these pool boards a gentleman who will be of advantage to those boards, and who will place his knowledge and experience at their disposal.

Proposed Property in Commodities.

There is another provision of the Bill which deals with the product becoming the property of the board. That is a fairly important provision, and I consider it absolutely necessary for the successful conduct of pools that such authority and power be given. It can be readily recognised that no pool is likely to be successful unless it controls the whole of the product which forms the basis of the pool. If it is possible for persons having representatives in other States to make the commodity so pooled the subject of an interstate contract, the principles of the pool can be defeated, and the efforts of those engaged in the industry rendered null and void. One only needs to mention that point to make the position clearly understood to anyone who has studied the principle. It is proposed under this measure, when a pool is formed, to give power to it to acquire property in the pool. That, of course, will be subject to the voters concerned. In other words the farmers who form the pool will have power, if they so desire, to give the pool board property in the commodity. When

such power is given, the pool board becomes the sole authority that can enter into any contract whatsoever for the disposal of the commodity. That renders the pool watertight, and gives the growers concerned complete control of the commodity which is pooled in this way.

Levies.

Another provision in the Bill is that dealing with levies. A commodity board or a pool board will have power to levy to carry on its functions and provide for its necessary administrative costs. In addition to that, it will be the authority that pays to the Council of Agriculture its proportion of the costs of carrying on that organisation. At the present time both the Council of Agriculture and the commodity boards have the power to levy, each for different purposes. Under the alterations proposed in this measure provision is made for the Council of Agriculture issuing a precept on a commodity board for its share of the costs of the Council of Agriculture, and the board will be the sole levying authority. When a commodity board is established, it will make a levy sufficient to pay its own administrative costs and its share of the costs of carrying on the functions of the Council of Agriculture. In addition to that, provision is made whereby funds can be built up for various purposes. It may be—it undoubtedly is in the minds of certain pool boards—that they will consider it desirable to go in for certain forms of insurance—carrying their own insurance risks, for example, against hail. If they so desire, they can go in for that form of activity. A board may make a levy with a view to building up the necessary reserves to continue as a trading board for any special object considered desirable by the pool board and approved by the Minister. A levy for such special purpose is made the subject of a vote by the growers concerned. That is to say, if a pool board desires to build up reserves to have an insurance fund of its members, or any other special purpose that may be of advantage to the producers, that can be done, but it will be subject to the right of the growers demanding and having a vote on the principle.

The Farmers' Right to High-Living Standards.

Briefly stated, those are the principles of the Bill now before the House. I am satisfied that when the amendments are taken in conjunction with the principal Act, and that Act is used properly by the primary producers of this State, it will do much to develop agriculture in Queensland, help to establish the primary producer on an economic footing, and give him that standard of living which he has a right to expect and demand in a free community.

WHY TIMBER ROTS.

The destruction of wood by decay is due to low forms of plant life known as fungi, which use as food certain substances of the wood. These fungi consist for the most part of fine thread-like filaments which penetrate the wood-cells, disintegrating the wood substance and leaving behind the powdery residue so characteristic of decayed wood. In places the filaments grow out to the surface of the wood to form compact bodies, the fungus frequently found growing on the trunks of both living and dead trees. These are an indication of advanced decay, and function as spore-producers, spores corresponding to the seeds of the higher orders of plant life; like these latter, they are distributed principally by the wind. Certain conditions of air, moisture, temperature, and food are necessary for their germination and the subsequent growth of the fungi. According to the control exercised over these factors, either by the nature of the wood itself or by the conditions under which it is used, will the natural durability be affected.

As the sap-wood of all trees contains a large amount of protoplasm, starch, and other essential plant-foods, it exhibits poor durability, seldom lasting long when in contact with the ground, though the natural durability of heart-wood varies with the timber. Posts cut from immature and fast-growing trees generally exhibit little resistance to decay.

Timber felled in autumn and winter (points out a writer in the "Journal" of the New Zealand Department of Agriculture) does not dry out as rapidly as that felled in the warmer months, and has thus less tendency to splits and cracks, which afford an opening for insects and fungi. Insects are noticeably absent at this time of the year, and by late spring the wood will have dried sufficiently to resist the attack of these pests.

Decay is most active near the ground-line. It extends deeper in loose and sandy soils than in clayey ones, in which latter the air supply is not so good. Post tops, joints in framed timbers, and other points where water collects also exhibit serious decay. In the presence of excessive moisture, however, decay cannot proceed, as illustrated by timber recovered from swamps in which it has been buried for hundreds of years.

STORAGE OF LEMONS—SOUTHERN EXPERIMENTS.*

Facts of interest to lemon-growers are disclosed in a report of experiments carried out last year with main-crop lemons by the Gosford District Citrus Packing House in conjunction with the Department of Agriculture.

A number of methods of storing were tried in previous experiments, but only two were persisted in—namely (1) in paper-lined cases, and (2) in unlined cases. The fruit was clipped during May, June, and July, the greatest care being exercised to avoid damage in gathering, and at all subsequent times. It was clipped leaving as little stalk as possible, two cuts usually being necessary—one to sever the fruit from the tree, and a second one to clip the stalk quite close to the button of the fruit. It was found that faster and more careful work could be done this way than in trying to sever and finish in one cut from the tree. The bulk of the fruit was green or only slightly coloured when clipped, and ranged from 2½ to 2¾ in.

The lemons were grown within a mile of the sea and stored in the same humid climate. They comprised all classes of fruit from different orchards; and to avoid damage to the tender rind of the fruit were subjected to a toughening process after clipping by being held in cases at the orchard, for a number of days (up to seven) before being removed for storage. In some instances the fruit was stacked in cases and left out in the orchard, and apparently without damage. The place of storage was underneath a weatherboard house, built on piles standing about 7 ft. out of the ground.

To afford protection from drying winds bagging was stretched around some of the piles, forming an enclosure in which the fruit was placed; the object being, if possible, to maintain a high relative humidity, and a reasonably low temperature. With the same object in view, as the weather became warmer in the spring, bags were placed over and around the cases.

A Minimum of Handling.

The fruit was put down in May, June, and July, and the test concluded at the end of October, some of the fruit being in store, therefore, over five months. Once in store, as little handling as possible took place. The cases were examined periodically, and decayed fruit removed, but no general overhauling of the fruit was permitted. Decay can usually be traced by the smell, and only boxes in which decay was known to exist received particular attention. It was noted that a few decayed fruits were found within, say, fourteen days after clipping, after which a long period elapsed before any further decay was found. This early decay was, no doubt, the result of injuries received during clipping, thorn pricks, &c. Practically all decay was the result of an injury, blue mould commencing at the point of injury, and eventually invading the whole of the fruit. Certain specimens developed spots, which proved to be the initial stages of black spot. "This is interesting," remarks the report, "in view of the fact that these lemons were in store at least three months before the disease became evident, which suggests that this disease enters the fruit long before it makes its appearance on the surface of the rind."

The Results.

Eighty-two cases of lemons were put down, out of which seventy-five cases of packed fruit were placed on the market; the total loss, therefore, was approximately seven cases. No actual count was made of the loss from decay, but it is safe to assume, according to the report, that the bulk of this loss was the result of shrinkage of the fruit. Of the seventy-five cases marketed, one case was packed from fruit put down in May, exhibited at the Gosford Citrus Show on 23rd August, 1924, and sold two days later. Twenty-two cases were marketed on 18th September. This lot were stored in unlined cases, and had to be marketed to save loss. They lost their attractive colour and began to wither through heat and drying atmosphere, and would soon have lost all commercial value. The balance of fifty-two cases were placed on the market on the 4th November, 1924. This fruit had been stored in paper-lined cases, and was a fair average sample of stored lemons. The colour was good, the rind tough without being withered, the stalks were green, and had in most instances calloused over the cut edges, and were firmly attached to the fruit. It was considered, however, that the fruit had reached the limit of the period of keeping in store.

---

* From "Agricultural and Pastoral Notes," New South Wales Department of Agriculture.

Temperature and Humidity.

Though good results were obtained by storing under the conditions described, it was considered that better results would have been achieved if means had existed of regulating temperatures and humidities. During the winter months, no special arrangements were needed to maintain these conditions, but once the warm weather and drying winds of spring set in temperature and humidity fluctuated considerably. To note these fluctuations, a dry and wet bulb thermometer was installed, and during the months of August, September, and October readings were taken three times a day —at 8 a.m., 1.30 and 8 p.m. Unfortunately, the readings from the dry and wet bulb thermometer gave very little definite information in regard to the temperatures and humidities at which to hold the fruit, owing to the fact that there were no means of holding temperatures, &c., to any particular readings; but from the experiments referred to, as well as from other lemon-storing tests, states the report, it is evident that high relative humidities and fairly low temperatures are necessary to hold lemons over long periods. As a working basis, it is suggested that the temperature be held below 70 deg. Fahr., and the relative humidity maintained at between 80 and 85 per cent.

Summary.

The results are summarised as follows:—

Lemons may be successfully held in such a storeroom as described over a period of several months.

Better results have been secured by storing in paper-lined cases than in unlined cases.

Very careful handling is always necessary in all operations.

The number of handlings should be reduced to a minimum. Once the fruit is put in store handling is necessary only to remove decayed fruit.

Green fruit when clipped produces a better cured lemon than tree-ripe fruit.

These tests have shown that tree-ripe lemons do not keep as well as green lemons. Tree-ripe lemons become too dark in colour after a short time in store, and should not be put down in any commercial effort of storage.

A toughening period of about seven days should be allowed the fruit, so as to avoid damage, before it is removed any distance from the orchard, prior to going into store.

Fairly low temperatures and high relative humidity are necessary in the storeroom. Temperature at or below 70 deg. Fahr. and relative humidity at from 80 to 85 per cent. is suggested.

While ventilation is necessary in the storeroom, drying winds that reach the fruit are fatal.

STAGGER WEED—POISONOUS TO STOCK.

The Stock Inspector at Warwick (Mr. T. H. Shepherd) writes:—

"Under separate cover I am forwarding you a sample of the so-called 'Stagger Weed.' At the present time losses are occurring in my district of both cattle and sheep. The symptoms are precisely like 'Zamia' poisoning, but there is no Zamia in my district. Owners are of the opinion that the losses are due to this 'Stagger Weed.'"

The matter was referred to the Government Botanist (Mr. C. T. White, F.L.S.), who replied—

"The weed forwarded by Inspector Shepherd as 'Stagger Weed' is *Lamium amplexicaule*. Feeding experiments with this plant have shown definitely that it is capable of producing 'staggers' in stock. An account of feeding experiments with this weed was published in the "Agricultural Gazette" of New South Wales for May, 1921, by Dodd and Henry. In conclusion, these writers stated—

> 'So long as animals remain on lamium feed, the condition continues; but if removed and placed on other feed, even in an affected locality, recovery is rapid. There is some evidence that the rapidity of this recovery varies directly with the length of time that the animal has been affected. When recovery takes place it is complete, and no ill effects whatever can be seen to remain.'

"I might mention that *Lamium amplexicaule* is not the plant most commonly known in Australia as 'Stagger Weed,' which is *Stachys arvensis*, a very similar weed closely allied to the Lamium and, like it, capable of causing staggers in stock."

THE FECUNDITY OF MORMONIELLA AND SOME PROBLEMS IN PARTHENOGENESIS.

By G. H. HARDY, Research Fellow, Queensland University.*

About a year ago, in a short paper, I summarised the conclusions arising from certain experiments dealing with the hymenopteous parasites of blowflies and two species of *Chalcididae* were referred to in that address. One of these wasps, *Mormoniella,* has been followed up with the object of determining how many eggs are laid by the female. The experiments gave averages of 182, 156, 222, and over 400, and not less than 35 puparia succumbed to the attack of each female parent parasite and yielded this progeny. All these numbers were in excess of those previously considered attainable and, moreover, the conditions under which these earlier experiments were conducted were such as to cause excessive losses occasioned by the overloading of puparia with eggs and by puparia of unsuitable age being used.

Up to that time, the ideas expressed upon this subject of progeny were summed up by Johnston and Tiegs in 1921 as follows:—"Observations by Girault and Sanders and by Froggatt and McCarthy showed that on an average one female may deposit 113 eggs, but, unfortunately, she distributes them only amongst 17 to 20 pupae (on an average), so that her destructive action is strictly limited."

Judging from my own experiments, it seemed that the number of eggs deposited by each female should not be less than five times the number given by previous authors, and if my estimate be correct, the value of *Mormoniella* might be enhanced fivefold.

The parasite lays its minute eggs in the comparatively large puparia of blowflies and to find and count these eggs is impracticable, so the only chance of verifying this estimate of the progeny is to rear for the adults. Already, as indicated in my previous address, there seemed to be sufficient knowledge gained to enable practically all the eggs deposited to be reared to maturity. Not only was the host of suitable age needed, but care had to be taken that not too many eggs were deposited in any one puparium.

In a subsequent test carried out on these lines, from one female, instead of about 113 parasites being reared from about 20 puparia, as was originally thought would be the case, no less than 550 parasites emerged from 86 puparia. Although this conformed with recent expectations, nevertheless, as will be indicated later, I now doubt if it has reached even the approximate maximum progeny obtainable.

Johnston and Tiegs further recorded:—"Unfertilised females also oviposit quite readily, the offspring being entirely males." This case of parthenogenesis I have also experienced and can vouch for, but there was no information available to indicate why this should be so, nor yet to show what bearing the phenomenon might have upon a subsequent generation. On this account, whilst breeding from a paired *Mormoniella,* an experiment was conducted by treating a virgin specimen under identical conditions.

The parthenogenetically produced progeny reached only 288 parasites, which number is thirteen in excess of half that reared from the paired specimen, whilst 57 puparia yielded these parasites against 86 being effectively parasitised by the fertilised female, thus the parthenogenetically producing parasites are two-thirds as efficient as the others.

It is a very simple explanation that I would read into the results of this comparative test. The known proportion of the sexes is considered to be approximately equal, one sex not exceeding 5 per cent. in number above the other. This suggests that the males only were reared parthenogenetically, the male eggs being fertile, the female eggs requiring the male sperm to germinate them. If this assumption be correct, it will have a far-reaching effect upon methods to be adopted in the breeding of blowfly parasites on a large scale, and it will affect future experiments dealing with the fecundity of *Mormoniella* in a like manner.

The sexes were together at the beginning of the experiments so far conducted, except in that parthenogenetic case, referred to above, where no males were used; and whilst the female lives as long as forty days, the males died within a few days and were not replaced. In consequence of this, the females may have exhausted their sperm-cells received from the males during the earlier portion of their egg-laying activities, and being without sperm-cells during the latter period would render the female eggs then deposited infertile. Hence there may have been considerable loss of female eggs during the latter portion of every experiment, indicating that as many as 200 more female eggs were deposited than there were adults reared.

If this interpretation of parthenogenesis in Chalcid wasps be proved, it may have a very important bearing on the question in relation to other insects, calling

* In an address before the Entomological Society, Brisbane, 16th September, 1925.

for a readjustment of certain views that are somewhat contentious though widely held. The phenomenon of parthenogenesis amongst hymenoptera is exhibited in several ways. There are a few insects such as certain saw-flies and gall-flies in which the male is unknown and it is suggested that these are perpetually parthenogenetic. Again, amongst insects that are known to reproduce in the ordinary way parthenogenesis may also occur, resulting usually in the production of only one sex, either females or males, the former called "thelotoky" the latter "arrhenotoky," whilst in those rarer cases where both sexes are so produced it is called "deuterotoky."

In gall-flies parthenogenesis may take the form of alteration of generations, the first generation of two sexes being followed by a generation of only females, this being followed again by both sexes and so on, thus "deuterotokous" parthenogenesis is established as part of the economy of the species.

In the honey-bee, unfertilised eggs are popularly credited with producing only drones. It has been assumed that the eggs are male till fertilised and then become female. Hence it is supposed that the sex is determined by the act of or the lack of fertilisation. On this account it has been confidently stated, and as confidently believed, that no male honey-bee has a father. These views are not necessarily favoured by the modern biologists, but it is very difficult once such ideas have taken hold, to force some better and sounder observations in their stead. The ideas expressed concerning the parthenogenesis of bees have fostered similar views with regard to that of other insects, and I think that some similar beliefs have been held in relation to the Chalcid parasites, but apparently they have not been expressed in print.

It seems possible that "arrhenotokous" parthenogenesis may have become part of the economy of blowfly parasites much in the same way as "deuterotokous" parthenogenesis is within certain gall-flies. It has yet to be proved that the female *Mormoniella* needs copulation with more than one male during her relatively long life of activity if all her female eggs are to be fertile. This polyandry, if it exists, would necessitate a larger proportion of males, which would naturally be induced with any insect having parthenogenesis resulting in a male progeny, so what at first sight appears to be an unnecessary overproduction of the male sex may really act as a counterbalance assuring a much larger female progeny in the following generation. In this way what has been considered a rather useless accomplishment may ultimately prove exceedingly advantageous if not vital to the wellbeing of the race possessing it.

The question now arises as to whether polyandry is necessary to procure the maximum progeny of *Mormoniella*, and, if so, it is reasonable to conclude that "arrhenotoky," being advantageous to any polyandrous race, has become a factor in the economy of *Mormoniella*.

POTATOES IN NORTH QUEENSLAND.

COMPARATIVE TRIAL ON TABLELAND AND COAST.

By N. A. R. POLLOCK, H.D.A., Northern Instructor in Agriculture.

In the course of the past season, trials of ten varieties of potatoes were conducted on the farms of W. S. Allen, Tolga, and O. T. M. Hansen, Carbeen, Atherton Tableland, in the summer months, and on the farms of Pilcher Bros., Cape River, Pentland, and A. W. Hughes, Major's Creek, Woodstock, in the winter months.

Seed of ten varieties was procured from Victoria for the Tableland trials, and was planted there towards the end of September. Seed from these Tableland trials which were harvested in January and February were used for the trials at Pentland and Woodstock, which were planted towards the end of March and early April.

On the Tableland, the early part of the season was very favourable, but it is thought a greater return would have been secured had more rain fallen in December, during which period the tubers would be making maximum growth. This is evidenced in the greater percentage of small or unsaleable tubers, when compared with the other trials, on which the rainfall was very favourable to high yields. At Mr. Hansen's farm, predatory vermin did some damage to some of the varieties, while at Pilcher Bros.' farm a heavy frost towards the end of July probably lessened, slightly, the yield of one or two of the later maturing varieties.

All plots were sprayed with Burgundy mixture (8 lb. bluestone, 10 lb. washing soda, to 40 gallons water) as a preventive against fungus disease.

TABLE SHOWING COMPARATIVE YIELDS OF VARIETIES PER ACRE.

Farms—	W. S. Allen, Tolga.					O. T. M. Hansen, Carbeen.				
Varieties—	T.	C.	Q.	LB.	Small. %	T.	C.	Q.	LB.	Small. %
Up-to-date	4	18	0	24	15	5	6	0	8	9
Scottish Triumph	3	16	2	22	38		Failure		..	..
Coronation	3	10	2	24	25	4	4	1	24	19
Carmen No. 1	4	19	3	0	10	3	18	2	8	10
Carmen No. 3	4	11	1	20	11	6	4	2	16	9
Clark's Main Crop	4	14	1	4	16	1	17	1	8	37
Manistee	2	7	0	16	37	2	19	0	0	16
Victory	3	18	2	8	10	5	4	0	12	13
Early Rose	2	11	0	8	19	1	0	0	0	59
Sussex Red		Failure		..	..	2	19	0	0	24

TABLE SHOWING COMPARATIVE YIELDS OF VARIETIES PER ACRE—*continued.*

Farms—	Pilcher Bros., Pentland.					A. W. Hughes, Woodstock.				
Varieties—	T.	C.	Q.	LB.	Small. %	T.	C.	Q.	LB.	Small. %
Up-to-date	7	1	1	20	6	12	18	1	5	5
Scottish Triumph	6	8	1	26	6	11	4	3	26	7
Coronation	4	17	0	26	4	14	19	0	11	4
Carmen No. 1	3	7	3	2	12	8	10	0	17	5
Carmen No. 3	4	8	2	20	10	8	19	0	18	6
Clark's Main Crop	2	6	1	12	15	9	1	3	13	10
Manistee	2	15	3	26	11	8	2	3	23	4
Victory	3	12	2	20	8	5	17	3	22	6
Early Rose	1	11	2	14	19	2	5	3	19	14
Sussex Red		Failure		..	..		Failure		..	..

The result of the trials must be regarded as very satisfactory, the yields at Mr. Hughes's farm being exceptionally good.

An interesting and very satisfactory feature is the success attendant on the planting of Tableland seed on the coast. A difficulty experienced in the North is in procuring a satisfactory supply of seed at the times of planting on Tableland or coast. (Tableland may be taken as on altitudes of over 2,000 feet, and coast as under that height above sea level.) To secure the best results, the Tableland crop should be planted to receive the first of the monsoonal or wet season rains which commence usually in November or December. Seed for this time of planting is generally hard to secure or to keep in proper condition from July or August, when it is in fair supply in the South. In the volcanic soils in the forest areas, the porous loam is usually sufficiently dry to permit of planting in mid-August or September, when a certain amount of root growth will be made without any growth appearing above ground until a sufficiency of rain falls. There is a possibility in this connection of an isolated storm falling with insufficient following to mature the crop, and this has occurred once or twice there in the last eighteen years, but usually on these areas September and October are practically rainless, or when a storm occurs in October, useful rains follow. On soils other than the porous volcanic loams, it is calculated that too much moisture would be retained to allow of the practice being adopted, while on the scrub areas, the possibility of rain in these months is very much greater. Consequently, the best time for planting potato sets on the Tableland is in October on the drier volcanic soil, and after, or preferably shortly before, a good fall of rain on the other areas.

On the coastal areas or at altitudes below 2,000 feet, potatoes should not be planted before the heaviest of the wet season is over, usually in the midde of March.

From then on, until May, dependent on the liability of the area to frost, may be regarded as the most suitable times to plant to secure the best results. During

these months seed potatoes of good quality are practically unprocurable, most growers resorting to the selection of the small tubers from commercial lots brought from South. As a consequence, a mixture of varieties is usually the result, while fungus diseases are often introduced in such seed. With the Tableland crop maturing in late January or February, seed therefrom would be available for the coastal plantings, more especially if such seed was dug in the immature state—it is a well established fact that immature seed produces a heavier crop than mature seed, just as the cutting of younger growth of cane produces a heavier stool of cane than the cutting of older growth—while the coastal crop maturing in July and August would provide seed nicely shot for October or November plantings on the Tableland.

In the interchange of seed between Tableland and coast, and *vice versâ*, the difficulty experienced in procuring seed at the right time will be overcome and the North rendered more self-supporting in this direction.

Until sufficient areas are cropped on Tableland and coast to permit of large supplies of seed being available, prospective growers on coast and Tableland are advised to get in touch with a view to the exchange or supply of seed. In this direction the services of this Department at Townsville or Atherton are now available.

In the yields of the different varieties, "Up to Date," which has in previous trials given the best all-round result, again occupies a prominent place, and is recommended with the other white-skinned varieties "Carmen No. 1," "Carmen No. 3," and "Scottish Triumph" as worthy of the most attention at present. "Coronation," a blue-skinned variety, though cropping well this season, has not done so well in previous trials.

"Clark's Main Crop," "Victory," and "Manistee" will be given further trials in future Departmental plots.

"Early Rose" does not appear to be suitable for Northern conditions and is not advised as worth planting.

"Sussex Red" was affected with "Sore Eye" (*Bacteriosis*) and produced potatoes of ugly shape and of inferior quality.

The cooking quality, as well as size and shape of all varieties excepting the latter, was excellent. At the recent Exhibition of the National Association, at Brisbane, samples of the varieties from the plots at Messrs. Hughes and Pilcher's farms were exhibited in the Departmental Court, where they provoked much appreciative comment.

As a profitable crop for farmers in the North, the potato should make a strong appeal, since the prices realised up to the present have rarely been under £10 per ton, but most frequently well in excess of that amount.

With a well-drained friable soil possessing a fair humus content and a sufficiency of the elements of plant food, such as may be found in every district on the Tableland and coastal slopes, a very large proportion of North Queensland's requirements should be met.

Plantings should be made at the right times mentioned previously, while sets of about 2 oz. in weight or the size of a hen's egg being considered most suitable. Sets should only be cut when whole ones are in short supply, and then allowed to stand for at least half a day before planting.

As a precaution against disease, it is advantageous to steep the whole seed for from 1½ to 2 hours in a solution of 1 lb. formalin to 30 gallons water or in a solution made up at the rate of 1 oz. corrosive sublimate to 6 gallons water. The former, which is non-poisonous, is preferable to the latter, which is very poisonous but has some advantages. When potatoes are to be cut into sets they should be steeped a day or so before cutting and not after cutting.

Cultivation should be frequent in the growing crop, as in this lies half the secret of success, and kept well hilled up.

As an insurance against loss through the action of fungus diseases of the plant, the crop should be sprayed with Bordeaux or Burgundy mixtures in early and mid growths.

When harvesting, the tubers should not be exposed to the hot sun for any length of time, but taken to the barn and spread there for a few days to toughen the skin and dry out sufficiently to keep well during transit to market.

GRAPE FRUIT.

Possibilities of Trade with Britain.

The following interesting note on the Grape Fruit trade in the United Kingdom is taken from a recent report from the Agent-General in London (Hon. John Huxham) to the Premier (Hon. W. N. Gillies):—

Of late years the demand for Grape Fruit in this country has developed considerably, and as the climate of Queensland would appear to be eminently suitable for the cultivation of this fruit, some particulars regarding the trade may be of interest to our producers.

The following figures show the quantity of Grape Fruit imported into this country in the years 1920-23:—

—	1920.	1921.	1922.	1923.
	Cwt.	Cwt.	Cwt.	Cwt.
United States of America	8,013	11,202	19,181	28,191
Other Foreign Countries	660	3,082	900	2,761
Cape Colony	1,824	1,501	6,233	7,798
British West Indies	2,814	5,481	5,534	10,648
Other British Possessions	423	183	152	751
Total	13,734	21,449	32,000	50,149

The figures for 1924 are not yet available, but there is little doubt that they will show a corresponding increase.

The principal supplies come from Florida, California, Porto Rica, and South Africa. A small quantity is shipped from Jamaica.

The price realised for this fruit varies considerably according to the quantity on the market, the weather, and the time of year they arrive. This season they have varied from 15s. to 45s. per case, but from 20s. to 25s. per case may be considered a fair average. The best time for the fruit to arrive here is from May to August.

The fruit should be packed in a hard and sound condition, and, although it should not arrive here green, it is essential that there should be no sign of deterioration. The degree of maturity to which the fruit should be packed can only be arrived at accurately by experience and experiment.

Needless to say, everything depends upon the packing, and it is absolutely essential that the greatest care should be taken that the fruit presents an attractive appearance when offered for sale here.

The cases should be of the following outside dimensions:—

Length	2 feet 1¾ inches
Height	1 foot
Width	1 foot

Wood of ¼ inch thickness is used. When packed, and after being nailed down, they should have metal bands round each end and round the centre to prevent them breaking open. It is also desirable that they be divided by a centre partition of wood ¾ inch thick.*

Each fruit must be wrapped in paper (stamped with a distinguishng mark) and graded to size. Each case should contain fruit of the same size and packed in counts of from 45 to 120, the quantity contained in the case being clearly marked on the end in stencil plate. For example—

A. G. Q.

96

GRAPE FRUIT.

The most popular counts on this market are 70, 80, and 96.

It is understood that the temperature at which the fruit is usually carried is from 42 to 45 degrees.

* The case referred to is the standard export citrus case prescribed by the Department of Trade and Customs for oversea shipment, and is identical with the citrus case in general use in U.S.A.—Ed.

TABLELAND MAIZE.

N. A. R. POLLOCK, H.D.A., Northern Instructor in Agriculture.

The Atherton Tableland ranks as one of the large producing centres of maize in the State, while it has, with its rich soil and freedom from serious drought in the growing season, the enviable distinction of possessing the highest average yield per acre, over many years, of any district within the State, and of any equal area in the Commonwealth.

The following figures have been extracted from the published statistics of the Department of Agriculture and Stock for the years 1916 to 1923 inclusive, as the acreage under crop and average yield per acre for each year of the various districts in the State in which an area of 10,000 acres or more was put under crop.

TABLE OF YIELDS.

—	Atherton.			Nanango.		
	Acres.	Bushels.	Average per Acre.	Acres.	Bushels.	Average per Acre.
1916	18,636	937,805	50·28	20,492	189,174	9·23
1917	15,705	586,574	37·35	15,419	429,316	27·84
1918	13,468	408,312	30·32	11,609	355,329	30·61
1919	15,616	664,868	42·58	11,389	144,291	12·67
1920	15,479	667,497	43·12	13,601	120,948	8·89
1921	15,021	445,175	29·64	16,612	256,981	16·47
1922	10,770	381,873	35·46	15,233	294,468	19·33
1923	10,411	447,094	42·94	16,414	178,027	10·85

TABLE OF YIELDS—*continued.*

—	Warwick.			Wienholt.		
	Acres.	Bushels.	Average per Acre.	Area.	Bushels.	Average per Acre.
1916	12,103	184,577	15·25	16,066	118,975	7·41
1917	8,904	206,108	23·15	13,229	366,625	27·71
1918	12,290	387,621	31·54	11,931	387,129	32·45
1919	7,427	85,296	11·48	11,593	168,262	14·51
1920	6,452	69,739	10·81	11,306	74,328	6·57
1921	6,592	134,739	20·42	17,955	425,111	23·68
1922	11,259	293,260	26·605	16,973	328,593	19·36
1923	10,659	163,951	15·38	11,798	117,906	9·99

Note the high average yields of the tableland and the low average yields of other districts in the years 1916, 1919, 1920, and 1923, which were years of low rainfall.

While the average yield is so far in advance of other districts, it is by no means as high as it would be if greater attention was paid to the selection of seed, suitability of variety, and general cultural methods in connection with the crop.

In average quality, it cannot be denied that the Tableland maize is very much inferior to that of other producing centres, and though this will be to an extent improved by the cleaning processes it will now go through in the pooling system, an absolute first quality product will not be obtained until pure seed of a variety calculated to withstand the weather influence is generally sown by growers. The poor quality of the average sample at present produced is due to the varieties, or rather the mixture of varieties, for there is no pure variety grown, which are entirely unsuited for the climatic conditions prevalent over the greater part of the maize-producing areas.

The Tableland Climate.

The climatic conditions during that part of the year under which the crop is grown are peculiar to the Tableland, and do not occur in any other maize-growing district in Australia.

The planting season is synchronous with the advent of what is popularly known as the wet season. In the Tropics—the Tableland lies between the 17th and 18th degrees of latitude south of the Equator—there is no spring season as understood in the Temperate Zone, and, as a rule, insufficient rain falls to warrant the planting of the maize crop before the wet season sets in—usually in December, sometimes in November, and very rarely in October.

At this time, the soil, after the dry months from August, possesses its maximum temperature, which, with the moisture from the thunderstorms with which the wet season opens, produces a forcing set of conditions tending to create a quick growth of coarse stalk to a much greater height than is usual in the maize-growing districts further south.

While the first month or so of the wet season is characterised by more or less heavy thunderstorms, with diminishing intervals between, and bright hot days during which the necessary cultivation of the young crop is affected, the rains later, when the grain is forming, are more persistent and generally lighter, while in the ripening period of the grain and when it should be drying off prior to harvest, the days are dull and cloudy with a persistent drizzling rain or mist, so humidifying the atmosphere that evaporation of moisture from the ripened cobs, to permit of their being harvested, is delayed until the end of July or August, when the rain usually ceases. The humid conditions of the Tableland are due to its elevation of from 2,000 to 3,000 feet above sea level, and to its contiguity to the Ballenden-Ker range of mountains, where the peaks, the highest in Queensland, over 5,000 feet above sea level, attract the clouds and give Innisfail and Babinda, less than 20 miles in a direct line from the western, and very much less still from the eastern limits of the Atherton maize lands, the heaviest rainfalls in the State.

These climatic conditions result in a forced growth of plant with usually a single cob in which the core is large, coarse, and pithy, containing a maximum of moisture or sap which dries out with difficulty. The grain produced is of a more soft and starchy nature than is typical of many of the varieties as originally introduced.

Atherton Maize.

An inspection of an average crop growing on the Tableland would show that the stalks grow very tall, frequently over 12 or 13 feet high, and that the single cob is borne high up, often out of the reach of man of small stature; that the cobs do not readily turn down after maturity is reached, owing to their erect growth, too close to the stalk; that the type of husk covering is not good in that it allows the penetration of moisture and permits the grain on the cob to be infected in the field by weevils; that the grain is of no particular variety, but shows that it has been hybridised by one or other of the several Dent varieties that have been so persistently introduced by growers without a proper understanding of the matter; and that the number of barren stalks, that is, stalks which do not bear a cob, is strikingly large. With a view to preventing the stalks from falling or blowing down, in which the big cob so high up, coupled with the looseness of the soil, assists the wind, the practice of "turning down," *i.e.*, bending the upper part of the stalk down at a point a little below the cob, is generally followed over the greater part of the areas devoted to the crop. This practice, besides rendering the stalks less likely to heel over, is considered to render picking easier, while the cob in its new position is calculated to throw all rain off. It may be noted that when the crop is thus turned down, late growing weeds such as "goat weed," "milk thistles," &c., are given a better chance to grow, and are frequently seen growing above the cob in its new position, thus shading it and prolonging the time in which it would otherwise dry out, as well as tending to induce the formation of moulds in the cob or grain.

The barren stalks usually are not turned down and, by their numbers thus seen, afford a striking example of the want of proper care in the selection of seed.

During harvest, the husks are frequently found showing damage from the caterpillars of various moths, common to maize, which either bore holes through the husk into the grain or eat out the silks or top of the cob, in both cases allowing more or less water to enter with a consequent damage to the grain. This is evidenced by a moulding of a few grains at the point of entry, a saturation of the husk at the base of the cob where some of the grain may be sprouting, or the discolouration or partial damage of the grain, or even total destruction (dead grain)

by moulds or other fungi, in which latter case, although moisture may not be directly responsible, it may be regarded as accelerating the progress of the disease.

Many of the cobs, especially those of the Dent type, though apparently undamaged, will be found on being broken across to be affected with slight mould in the core and at the point of attachment of the grain to the core. Where a cob is found approaching in type the Yellow Dent or similar variety with a deep grain, although it may not be damaged by fungi, the grain will be light in weight and chaffy in appearance. The Tableland average sample of maize is usually deficient in lustre or brightness of colour, the amount of horny starch is lower than it should be, and it is light in weight since it is the rule more often than not to dump or ram the bags in order to make them weigh the requisite 160 lb.

The Problem of Diminishing Yields.

Complaint is made by many farmers that the average yields per acre on their farms is quickly diminishing. While it is probable that, on some of the areas on which maize has been the only crop grown for upwards of fifteen and twenty years, the returns would be lowered by the depletion of the necessary quantities of the elements of plant food through such continuous cropping with one crop without the use of fertilisers, this reason cannot be advanced for the diminished yields on other farms not so continuously cropped.

It is considered that the chief reason for such diminished yields lies in the lack of a suitable variety to withstand the extreme humidity, and in the present use of seed in which the vitality of the plant therefrom as instanced by the undue proportion of barren stalks in the fields, is insufficiently high.

Fertilising Experiments.

During the past season experiments with fertilisers were conducted on three farms on the Tableland using each farmer's own seed.

One trial was conducted on a farm in the scrub area that had been under cultivation for a period of about fifteen years, but on which during the preceding season a good deal of loss had been caused by Head Smut (*Sorosporium Reilianum*).

This fungus disease has not been common on the Tableland in past years, but was rather serious on several farms during the season 1923-1924. It can only be effectively controlled by the use of clean seed and by a rotation of crops to allow the spores of the fungus in the infected fields to die out, in the absence of a host on which to feed or reproduce. During the immediately past season the disease was less evident that in the preceding season.

The object of the experiment was to ascertain the influence of various fertiliser mixtures on yield, and at the same time to see if the fertilised plants by a more vigorous growth would show any increased resistance to the attack of the smut fungus.

Unfortunately, the proportion of barren plants was not taken, but the loss due to mouldy cobs discarded during harvest was 15 per cent., and to Head Smut 5 per cent., a total of 20 per cent., or one-fifth of the crop. The result per acre with the grain calculated to 14 per cent. of moisture content is as follows:—

Plot.	Superphosphate. Lbs. per Acre.	Sulphate of Potash. Lbs. per Acre.	Sulphate of Ammonia. Lbs. per Acre.	Lime Cabonate. Lbs. per Acre.	Yield per Acre.		
					Cwt.	qrs.	lbs.
1	200	..	..	100	15	0	15
2	200	..	50	50	18	1	23
3	200	50	50	..	17	1	5
4	60	20	120	..	16	0	15
5	120	30	30	20	16	3	18
6	240	60	60	40	16	1	0
7	..	Control—	No manure	..	15	0	6
8	80	30	70	20	17	3	1
9	120	45	105	30	17	1	14
10	160	60	140	40	18	1	14

The results in yield do not point to a sufficient increase with any one fertiliser or mixture to pay for the application even if another 20 per cent. for loss due to smut and mould was added, while the effect of the fertiliser in smut control was a reduction of from 6 per cent. in plots 1, 5, and 7, to 5 per cent. in plots 2, 3, 4, 6, and 8, and to 4 per cent. in plots 9 and 10, pointing to the effect of the higher combinations of phosphoric oxide and nitrogen which was insufficient to be of value.

On this farm in the previous year, the grower asserted that he had harvested over 60 bushels to the acre from the major portion that he had under crop. With the small increase due to fertilisers it cannot be said the soil is wanting in fertility, but that in all probability if pure seed of a high-producing strain of a suitable variety had been used, a satisfactory yield would have been obtained without fertiliser application.

Another trial with fertilisers was conducted on a forest soil which had been placed under cultivation some forty years ago, and which had probably in that time produced some thirty crops of maize, while no fertiliser had ever been applied or crop ploughed under to keep up the humus content. While a series of fertilisers was applied on a portion during the past season, other portions were planted with leguminous crops to be ploughed under so that fertiliser applications thereon could be made in the ensuing season.

The plots were seeded on 29th January, which is regarded as too late usually to allow of good yields. The results show with the grain calculated to 14 per cent. moisture:—

Plot.	Superphosphate. Lb. per Acre.	Sulphate of Potash. Lb. per Acre.	Sulphate of Ammonia. Lb. per Acre.	Lime Carbonate. Lb. per Acre.	Yield.		
					Cwt.	qr.	lb.
1	120	..	..	80	1	3	11
2	120	30	..	50	2	1	4
3	120	30	30	20	3	3	24
4	180	..	..	120	2	3	27
5	..	Control—	No fertiliser	..	2	2	6
6	180	30	..	90	3	0	9
7	180	30	30	60	4	3	10
8	180	45	45	30	4	2	19
9	240	60	60	40	5	1	21
10	..	Control—	No fertiliser	..	3	1	11

The records of unproductive plants and of those on which the cobs were discarded during the harvest as worthless owing to mouldy grain (there was no head smut on the area), were for each plot, which was one-tenth of the area:—

Plot.	Number of Plants on Plot.	Percentage Bearing no Cobs.	Percentage Bearing Mouldy Cobs.	Percentage of Weight of Core to Whole Cob.
1	484	50	28	19
2	484	49	35	23·5
3	484	38	31	25
4	484	44	28	26
5	484	45	34	25·5
6	484	43	26	24
7	484	45	34	23·5
8	484	24	35	23
9	484	19	30	25·5
10	484	42	25	24
Average	484	40	31	24

Attention is drawn to the weight of core, which averages nearly one-fourth of the weight of the whole cob.

Assuming that the seed used had been of equal viability to the average of that producing plants from which cobs were harvested, and that there had been no loss from moulds, the results would have been—

Plot.	Cwt.	qr.	lb.
1	5	1	24
2	6	2	25
3	9	0	24
4	7	1	25
5	7	0	10
6	5	3	19
7	13	1	21
8	9	2	3
9	9	2	5
10	7	2	12

In this table the result from No. 7 plot stands out above all others. In previous trials on forest lands during three consecutive years, it was demonstrated that on soil that had not been cropped for any great length of time, the application of 180 lb. of superphosphate per acre gave in each trial the most payable result. This result in No. 7 plot would seem to indicate that the same quantity would appear most profitable when nitrogen is added, for the longer cultivated soils in which the organic matter or humus content has become largely depleted. A third experiment with fertilisers was conducted on forest soil on the farm where the 180 lb. of superphosphate alluded to produced the most profitable result in each of the three years the experiment was repeated.

Phosphatic Manures.

The experiment this year was to compare the result from equal quantities of the different phosphatic manures available. The yields are calculated as per acre, the moisture content of the grain being corrected to 14 per cent.

	Tons.	cwt.	qr.	lb.		Bus.	lb.	
Plot 1—180 lb. Superphosphate	1	3	2	8	or	47	8	per acre
Plot 2—180 lb. Basic Super.	1	3	3	4	or	47	32	per acre
Plot 3—Control no manure	1	5	2	8	or	51	8	per acre
Plot 4—180 lb. Nauru Island Phosphate	1	6	3	4	or	53	32	per acre
Plot 5—180 lb. Meatworks	1	7	2	12	or	55	12	per acre
Plot 6—Control no manure	1	2	0	0	or	44	0	per acre

From this trial it would appear that the citrate soluble phosphoric acid in the Nauru Island phosphate and meatworks is of more value than that which is water soluble in the ordinary superphosphate. The yield in Plot 3, where no fertiliser was applied, does not compare with that of Plot 6, also unmanured. The yield of the latter plot, however, is more in conformity with the control plot of previous years.

In this experiment the seed used approached the Flint type, the resultant grain being of good quality and bright colour. The percentage of mouldy cobs was almost negligible, while the weight of core was 13 per cent. of the gross weight of cob.

Summary.

To summarise the position, it will be admitted that, on the evidence adduced in the foregoing, the inferior quality of the Tableland grain is entirely due to the growth of a type of maize, which, of its nature, is not adapted to withstand the bad effects of the extremely humid atmosphere common to the Tableland during the period in which the crop is produced. The high percentage of plants which produce no grain offers conclusive evidence that the seed used has not been selected with sufficient care. Unproductive plants, though yielding no grain, will produce pollen, which, falling on the silks of productive plants, can be expected to transmit their weakness wholly or in part to the grain resulting from the impregnation. With this knowledge it is not to be wondered that yields would tend to become of lower average.

The first care in any endeavour to increase production and to raise the average quality of the grain should be to secure a variety to suit local conditions. Experience has proved that the Dent types are all unsatisfactory and that those of the Flint type will better resist the wet conditions, as far as the moulding of the grain is

concerned, and will provide a brighter and heavier sample that would be classed in any market as of prime quality. Obviously this variety must be kept pure, to do which the cropping of an area so isolated as to disallow pollination by another variety is indicated. With an area of this description seed in quantity could be supplied to plant other areas similarly isolated, when seed could be supplied to eventually plant the whole of the Tableland area.

On the first isolated area, particular attention could be paid to the improvement of the variety to better suit Tableland conditions and to build up a high producing strain, while at the same time more accurate information could be gained by the application of various mixtures of fertilisers, spacing tests, &c.

To improve the selected variety to suit Tableland conditions, careful attention would be paid to the type of husk covering, which should be such as to well protect the grain from the entry of moisture or damaging insects, and to the position in which the cob is borne on the stalk as well as to the angle it bears to the stalk, so that when mature the cobs will turn down naturally and allow the water from rain to run off at the tip, while with the lower position of the cob on the stalk there will be less liability of the stalks heeling over when a high wind blows. In the improvement of type of grain and yielding capacity, selections of cobs borne at a medium height on the stalk and at a satisfactory angle, showing grain of the desirable type in regular rows, completely filling the cob from base to extreme tip, would be chosen for ear to row tests.

In "ear to row" tests the same quantity of grain from each cob is sown in individual rows; just at the time of tasselling and before any pollen is matured, each alternate row is detasselled and any cobless stalks cut out of every row, the object being to ensure that the resultant grain on the detasselled stalks will be the product of two producing parents and thus of stronger vitality. During growth cobs on the detasselled rows of desirable husk covering and position on the stalk are marked. After each detasselled row has been harvested separately, selections are made from the marked cobs of the highest yielding rows for the new season's "ear to row" test, and the balance of the grain from these rows used to seed what is termed the stud plot, from which the seed will be available to sow the larger areas.

Thus each season should see an advance in the yielding capacity of the seed from the best ears in the "ear to row" tests which will be transmitted to the stud plot, and from there to the larger areas, until subsequently the whole of the Tableland crops will be produced from seed of this high-producing strain.

Any endeavour to propagate a pure variety without the necessary isolation will be largely doomed to failure, since, as pollen is frequently carried over half a mile and has so been noted on the Tableland where a breeze is usually blowing, that of the mongrel type now grown would render at least a part of the resultant seed impure.

Photo.: O. A. Jones.]

Plate 90.—Reflections.—On the Upper Brisbane, near Esk.

DAIRY FODDER PLOTS AT TOOGOOLAWAH.

A. E. GIBSON, Instructor in Agriculture.

For some years the Department of Agriculture has endeavoured to interest dairyman and stockowners generally in the matter of fodder provision for their herds during those périods whereby reason of the lack of succulence in the natural pastures, yields from their herds have been considerably lessened, and in some cases, even reduced within measurable distance of vanishing point.

The practice of arranging with interested farmers to carry out trials designed and supervised by officers of the Department, has met with a good deal of success. The results to date have clearly shown that by early and careful preparation, heavy returns are readily available of rich, succulent, milk-producing fodders, and that a continuity of this class of food can in normal seasons be kept up to tide milch cows over periods during which their productivity is affected by the gradual depression, induced in each animal's system, by being called upon to make use of rough grasses of low nutritive value, at a time when weather conditions were at their worst.

Ocular evidence has shown that improved milk supplies and a correspondingly improved return from the factory is inducement enough for other neighbouring farmers to profit by the example of the one who first adopted the system of growing crops regularly, for his dairy stock, actually on a farm an inexpensive method of maintaining an income.

In the present crop trials carried out on Mr. T. Coleman's property at Toogoolawah, no fertilisers of any kind were used. The plots were situated on well-prepared alluvial soil near Cressbrook Creek, which had been under cultivation for a number of years.

The plots were sown on 31st March, 1925, and were harvested for yield-computing purposes on 30th July, 1925, consequently each yield submitted represents four months' growth of fodder, and judged on this basis may be considered as highly satisfactory.

A more vigorous growth was noticeable in the case of Florence wheat and peas or tares and the Skinless barley with a similar mixture, both of which were well out in ear and rapidly maturing rye had made a dense growth in both instances, but only a few heads were to be seen, and probably a further three or four weeks would be required to bring it to a similar state of maturity to that obtained by the Florence wheat at date of harvesting. The following yields were recorded:—

	Tons.	cwt.	qr.	lb.
Florence wheat and peas	7	14	1	4
Cape barley and peas	9	11	1	0
Skinless barley and peas	10	15	1	12
Rye and peas	8	10	1	12
Algerian oats and peas	8	3	3	20
Canary seed and peas	11	8	0	24
Florence wheat and tares	7	4	2	16
Cape barley and tares	9	0	0	0
Skinless barley and tares	11	1	3	4
Rye and tares	12	13	3	20
Algerian oats and tares	10	15	1	12
Canary seed and tares	8	10	1	12

In view of the fact that some of the plots might be regarded as too immature for the purpose of obtaining the maximum yield, further weighings for comparative purposes were made on the 24th August, with the following results:—

	Tons.	cwt.	qr.	lb.
Algerian oats and peas	11	9	3	12
Rye and peas	8	13	2	8
Canary seed and peas	7	17	2	0
Algerian oats and tares	13	19	2	6
Rye and tares	9	9	2	16
Canary seed and tares	13	14	3	8

Plate 91.
Florence Wheat and Tares. Yield—7 tons 4 cwt. 2 qrs. 16 lb. per acre.

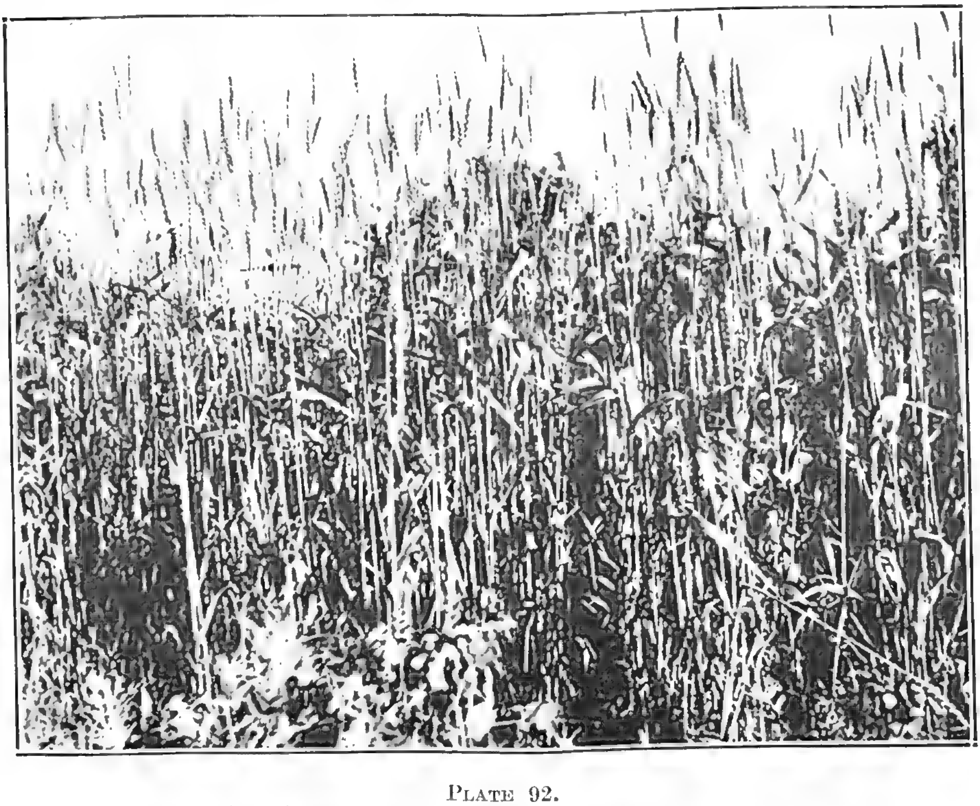


Plate 92.
Florence Wheat and Dun Field Peas. Yield—7 tons 14 cwt. 1 qr. 4 lb. per acre.

When selecting the fodders for the test, cognisance was taken of their respective periods of maturity so that a continuity in the supply of green fodder might be kept up. Obviously the grower by using judgment in the matter of arranging for succession sowings should readily be able to maintain his supplies, and in this way ensure a more regular state of productivity in his herd.

Observations made respecting the period of development of the different crops were as follows:—Florence wheat and Dun field peas were ready for use earlier than any other single crop or combination, followed by crops in the order named: Florence wheat and tares, Skinless barley and peas, Cape barley and peas, Skinless barley and tares, Cape barley and tares, Rye and peas, Rye and tares, Algerian oats and peas, Algerian barley and tares, Canary seed and peas, Canary seed and tares.

Observations made indicate that it is advisable when arranging for mixtures of crops to confine the sowing of peas to the early-maturing cereals. Florence wheat, Skinless and Cape barley, as the peas begin to lose weight as they approach maturity.

Plate 93.

Cape Barley (in shot blade stage) and Dun Field Peas.
Yield—9 tons 11 cwt. 1 qr. per acre.

Tares on the other hand have a longer growing period and retain their succulence better than the field peas, consequently they are more suitable for use with Algerian oats, Canary seed, and Rye.

To those dairymen who are interested in maintaining supplies to their respective factories throughout the winter period, the following quantities are recommended for use in connection with the above class of fodders.

Wheat 30 lb., Dun field peas or Black Tares 20 lb.
Barley 40 lb., Dun field peas or Black Tares 20 lb.
Rye 30 lb., Dun field peas or Black Tares 20 lb.
Oats 30 lb., Dun field peas or Black Tares 20 lb.
Canary seed 10 lb., Dun field peas or Black Tares 20 lb.

COFFEE-GROWING IN QUEENSLAND.*

(By the late T. A. BROMILEY, formerly Instructor in Coffee Culture.)

One of the multitude of economic crops Queensland has proved herself capable of producing to perfection is coffee. Years ago, under the guidance of an able instructor, M. H. Newport, it seemed likely that this crop would become one of our staple agricultural products. In the North a considerable aggregate area was planted; the trees bore abundantly; in some cases, it is averred, as much as 15 cwt. of beans per acre were garnered under favourable conditions and good cultivation.

The average for years was 10 cwt. per acre. Such results have been frequently obtained in the southern parts of the State, indeed surpassed. After nearly thirty years of cultivation of coffee in Queensland, the writer has never seen any form of disease attack the trees. Notwithstanding these most favourable conditions, the acreage under coffee declined. This falling off was the result of several causes. Perhaps the universal planting of sugar-cane, and consequent diversion of labour to the canefields, had much to do with it in some districts, as coffee ripens about the time canecutting commences.

This dearth of labour would be acutely felt in the larger areas, and, as these conditions could not be altered, many fields went out of cultivation, wholly or in part, in consequence.

Another deterrent factor, for the small grower, at any rate, was the lack of a marketing centre. Having, probably, no purchaser for his crop but the local storekeeper, who, in his turn, had only his restricted local market, could not but have a depressing effect, at least such conditions would not tend to the expansion of the coffee industry.

This state of affairs certainly obtained in the southern portion of Queensland.

The novelty of the crop to Queensland farmers, no doubt, led to many mistakes in the field and in the handling of the harvest.

Until a larger settled population occupies the central coast districts, scarcity of labour will continue near the canefields.

There are, however, whole tracts of country in both the Northern and Southern parts of the State far removed from the canefields, eminently suited to the production of coffee. It is quite possible that this difficulty of labour shortage for harvesting may be overcome by co-operation, but the cultivation of the crop at present cannot be undertaken on the large plantation system. It is, however, especially suited to the small grower, with several children to assist at picking time. The harvesting finished, the balance of the year's work upon an acre or two would be very light, and would take but a few days. The coffee tree is as easily grown as any other fruit tree, and with less trouble and expense than some, as, so far, it has shown no sign of disease, therefore spraying and washing are not necessary. No special cultivation is needed beyond such attention as a careful fruitgrower would give to his trees. The yield per tree averages higher than in some coffee-growing countries.

The labour of harvesting the crop—that is, the picking of the berries—is well within the power of juveniles of ten or twelve years of age. The shrub will grow well and bear abundantly in any moderately fertile land out of reach of severe frost and where there is an average yearly rainfall of, say, 38 inches. When the tree is established, it will stand spells of dry weather as well as any other crop we cultivate. Most newly opened scrub land, if undulating and naturally drained, is perfect for coffee, the yield abundant, and of high grade. But the shrub will accommodate itself to a greater range of soils and situations than some other fruit-bearing trees. The writer has seen it growing and cropping well on the sea-coast not more than a hundred yards from high water, and only 50 or 60 ft. above it, the soil being blady grass forest. In another district a few trees doing well in coarse, gritty, river drift. Of course, such soils and situations as these are not recommended, and are only mentioned to show the farmer, or others who would try coffee-growing, that the land they have will answer, subject to the conditions of freedom from frost and with a fair rainfall. Light frost, if not too long continued, will not hurt the tree.

It will thus be seen it is not a question of "Will coffee grow in Queensland?" nor of "Will it yield profitable crops?" Those questions have long since been answered in the affirmative.

Not only does it bear heavily and regularly, but its product has been classed in London as amongst the world's best.

---

*A revised reprint from "Q.A.J.," Vols. XIV.-XV., Dec.-Jan., 1920-21.

The Present Position.

Latest figures of imports into the Commonwealth show that 2,605,240 lb. of coffee came in from overseas. Queensland ought to capture the bulk of that trade. It can, and should be done. The state of our national finances demands that we send not one shilling away for what we can, with some assistance over several initial difficulties, produce at home. What is the nature of these difficulties? Can they be surmounted? They may be summed up under three heads. First, shortage of labour in some districts for harvest work. Second, need for a market at some central point where merchants and others might see that a first-class article can be produced in quantity in Queensland at a price, quality considered, almost, if not quite, as cheaply as from other parts of the world. The third obstacle is a minor one—unfamiliarty with the crop; still, it is an obstacle, but easily overcome.

With regard to the first, it is suggested that farmers and others following rural pursuits plant a patch as an auxiliary to their incomes. A few hundred trees, up to an acre or two, could be easily tended, and the remuneration, as will be shown later, very encouraging.

As a cover for poultry, a field of coffee has no equal. By the way, this feature might receive the attention of those engaged in poultry-raising in the warmer parts of the State. Light dressings from the fowl-yard would keep the trees in splendid health and ensure maximum yields. The shade of the trees would do the same for the fowls. Then co-operation in the treatment of the berries, that is the "pulping"—taking off the red outer skin by means of a small machine called a "pulper"—followed by fermenting, washing, and drying.

The second condition has received serious consideration. An effort might be made to meet it by establishing the system that was so successful in the Department of Agriculture and Stock in respect to cotton-ginning before the cotton industry had assumed its present proportions—namely, to make advances upon coffee in "parchment" consigned to the Under Secretary for further treatment—that is, "hulling" or "peeling"—removing the inner or "parchment" skin—grading, and marketing. By this means the grower would be relieved of the most difficult part of the work of preparing the beans for market; and, what is of paramount importance to the grower, his coffee would thus be placed under the immediate notice of bulk buyers. The amount of advance proposed is 7d. per lb. for properly prepared, clean parchment. Reckoning the yield per acre at 1,000 lb., a not-at-all-extravagant estimate, the gross return would be £29 3s. 4d. The finished beans should be worth not less than 1s. per lb., which would be £50; but from this sum must be deducted the loss of weight of parchment skin, about 18 per cent., and the cost of hulling, which two items together would aggregate about £13 10s. This deducted from £50 would, of course, leave the net amount of £36 10s. These calculations are only approximate. The trifling difficulty of unfamiliarity with coffee production by agriculturists may be removed by the appointment of a qualified instructor with practical experience of all branches of the business.

Conditions and Methods of Cultivation.

Coffee is a hardy shrub, but there are certain conditions which must be observed if it is to be cultivated for commercial purposes. First, there must be freedom from frost. Coffee will do its best at temperatures ranging from 60 deg. to 95 deg. Fahr., but will not suffer in the low 40 deg. Fahr. if not too long an exposure. It will also stand much higher temperatures than 95 deg. Fahr. if there are occasional falls of rain. This mention of rain is, of course, in consideration of crop. The tree will resist drought as well as any fruit tree grown in Queensland. Naturally, however, long spells of dry weather militate against the crop, as is the case with any other shrub or tree.

Strong, continuous winds are inimical to the plant, therefore the site selected for its growth should be determined to some extent by the direction and intensity of the prevailing winds of the district. In some areas, the S.E. winds are very trying, and it would be well to avoid exposure to such winds, if possible. In most districts of Southern Queensland, at any rate, north-east, north, and north-west aspects are good unless some unusual local feature exists.

Undulating land is better than flat land in that it, generally speaking, drains better—an important feature, for good drainage is absolutely necessary to the health of the tree. Where natural drainage is not good it must be made so artificially. Hillsides suit coffee well, but they are liable to wash in heavy rains, unless there are plenty of rocks and boulders, to which the tree does not object, and soil enough to get well rooted. Remembering this fact, many a piece of land, quite unsuitable to horse work, might be turned to profitable account.

Any fairly fertile land suits coffee. Red volcanic is among the best, but, as a rule, it is very porous and soon feels the effect of a dry spell of weather. When the trees have attained their fourth year of growth, however, they cover the ground so completely that evaporation from the soil is much mitigated and the roots have got down to the normal moisture level. Scrub lands, especially the foothills of scrub-covered volcanic ranges, are the best possible for coffee, provided, of course, that there is a fair rainfall, which is usual in such localities.

Not only does the plant accommodate itself to varying qualities of soil, doing well in most, but it as readily adapts itself to proximity to the sea, or long distances from it. But, from the writer's own observation, it succeeds best at distances of 1 mile to, say, 20 miles from the sea. Good crops, as previously remarked, have been taken from trees growing not many yards away from salt water, and only a few feet above it.

Having now reviewed very briefly the necessary conditions for the successful production of coffee, the next consideration is the obtaining of plants. This involves the procuring of seed and making of a nursery bed.

Site and Seed Bed.

For the bed, select a slightly sloping site. Dig the soil well to a depth of 12 in., removing all roots and stones, if such there be. Rake well and finish off smoothly. Dig a shallow trench on the highest side, a little above the bed to carry away excess of rain. Make the bed, or beds, 3 ft. wide so as to be able to reach conveniently from either side for weeding, if necessary. Paths between beds should be 18 in. wide to facilitate walking with a watering-pot if irrigation becomes necessary, as in most districts it will. The bed must be shaded in the following, or similar manner:—Procure a few forked "sticks" about 6 ft. 6 in. long to bottom of fork; erect these around the bed, leaving them about 5 ft. out of the ground. A few light, straight saplings placed in the forks connecting the whole will make a frame, upon which lay a few leafy branches. On them, again, place several light saplings to prevent the branches being carried away by the wind. This shade should extend to 18 inches outside the margin of the bed in every direction. It must be remembered that the cover is only to be partial. If leafy branches are used the leaves will probably begin to fall about the time the seeds will be showing through the soil; for that reason wattle branches answer well. The bed now being ready, proceed as follows:—

Line with a string, or mark with a straight stick, lines across the narrow way of the bed 3 in. apart. Dibble the seeds in to the depth of 1 in., following the lines and spacing them about 3 in. one from the other, along the mark. It is well to put in a little peg at the beginning and end of each line so that the seeds may not be disturbed if it is found needful to prick up the surface of the bed before the seeds germinate. It is perhaps needless to say this pricking-up must be very lightly done, and only between the lines, not near the seeds. The germination of the seed will take from four to six weeks, depending much upon the weather. During the whole of this time the bed *must be kept moist;* if rainy weather supervenes, then less artificial watering will be needed. The soil must not be drenched, but, to reiterate, it must be kept moist till the seeds appear above ground. A finely perforated rose should be used for sprinkling. A covering of some sort of short mulching laid on the bed to the depth of about half an inch would, in some measure, prevent the packing of the soil by watering. Chaffed blady-grass, being free from seeds, would do very well. But if shade and watering be attended to, mulching will not be necessary.

Planting.

The young plants will be ready for the field by the time they have attained a height of 9 or 10 in. This will be when they are about 9 months old. In practice this would mean the succeeding spring of the year. The distance apart of the plants in the field will vary a little according to the quality of soil. If the latter is only moderately fertile, 7 ft. by 7 ft. apart would be found about right. In good rich soil the plants should be 8 ft. by 8 ft. apart. In setting out the field for planting, lay off the base line, and set out the first line at right angles from it. Make the first hole for planting on the base, at the point of contact of the two lines. Now lay off the second line 8 ft. from the first line, but instead of holing on the base line, measure off 4 ft. from it along the second line. Proceed in this way till the last line is reached. The trees will then stand alternate to each other throughout the plot. The holes to receive the plants should be made 18 in. each way—that is, in length, breadth, and depth.

In removing the soil, place the top half to one side and the lower half on the other side. It would be well to break up the bottoms of the holes with a spade-bar

before filling in the soil that has been removed. In replacing the earth in the holes put in the surface stuff first; it is a good plan to rake in enough of the surrounding surface to fill up the hole, spreading the soil from the bottom of the hole where convenient. If the soil is good from top to bottom, then all can be restored to where it was removed from. The excavations should all be filled in, and the position the tree is to occupy marked by means of a stake or peg. If the plot to be planted is fairly level the lines may be easily spaced by means of three lining rods, and a correctly marked staff—8 ft. in the instance now being considered—to indicate the position for the plant. A stake must be placed where shown by the measuring staff. If this is carefully done the trees, when established, will show lines in several directions, and facility of working with horse tools, as long as that may be safely done, be secured.

The operation of planting may be said to be the most important work in connection with the establishment of a coffee field. Planting, badly performed, can never be remedied; therefore, great care should be exercised at every step, and the recompense will be sure.

In removing the plants from the seed bed, be careful not to break the taproot if it can possibly be avoided. To reduce this risk to a minimum, carefully dig a trench in front of the first row of seedlings to a depth of 9 or 10 in.; it need not be wider than the spade can be worked in. Now insert the spade perfectly vertically in the mid-distance between this first row and the one next behind it. Pull the handle of the spade so as to cause the plants to lean somewhat forward. Release the spade and insert again the width of itself in advance, and so on, to the end of the line the narrow way of the bed. If the spade be now carefully passed under the plants at the bottom of the trench, 9 or 10 in. down, and the plants pressed forward with the right hand on to the spade, they can be lifted with ease and the least possible risk of damage. Place the plants in a basket, or box, or, better than either, in a light barrow for transport to the field. Keep them covered from the sun with a sack. Keep as much soil as possible about the roots when removing them from the seed bed.

From the centre of each place intended for a plant remove as much soil as will easily accommodate it without cramping its roots. In particular, see that the taproot is kept perfectly straight. Hold the plant in position with one hand; with the other, draw in sufficient loose soil to fill to the surface, taking care to fill in well about the laterals, which must be kept as nearly as possible to the "lay" they assumed in the seed bed. Holding the plant firmly, now pour round it enough water to settle the soil among the roots. Do not allow the plant to sink lower (as it would have a tendency to do under the watering) than a couple of inches below the general level of the surrounding surface. Do not use the boot to press the soil about the plant; the grouting in with the water will have settled the earth better than any foot pressure could. Shade the plants from the mid-day sun till they "take hold." A broad shingle or two thrust into the soil on the northern side, with an inclination over the plant, will do very well, but, if shingles cannot be procured, leafy branches may be used. When the young trees have attained a height of 12 in. they must be staked to prevent their being blown over by strong winds. The coffee plant does not make many surface roots till three or four years old; consequently, they are likely to suffer severely by being blown about, especially in the gales often accompanying our summer rains. In well-sheltered positions staking may, perhaps, not be necessary, but in most localities recourse must be had to stakes. As they may have to stand for a year or two they should be of timber that does not quickly rot. Split hardwood is the best, of course, but there are other timbers which would answer the purpose, no doubt. Knowing the object to be attained, the planter will select suitable stuff. The stakes, if of hardwood, should be 1½ in. by 1½ in., and about 3 ft. 6 in. long, and be driven a foot into the ground. Some planters use but one support, by which the tree may be saved from being blown down, but certainly does not prevent it being lashed about, and, possibly, seriously injured. Two stakes driven firmly in, one on each side of the tree at a distance of, say, 10 in. from the stem, and placed in such a position as will sustain the tree against the prevailing winds, is by far the best method. Manila or coir lashing may be used for tying up; any soft, strong material will do. These lashings will need examining at intervals to see that the knots at the stems have not unduly tightened nor worked loose, and to replace any that may have broken either from strain or decay. Another plan which worked admirably, but needed care, was to take two or three turns of ti-tree bark around the stem, then take a length of No. 16 gauge galvanised wire, enough to reach from one of the stakes to the tree and back again to the stake; add to this length, enough wire to allow of tying. Double the wire in the middle, but not closely. Pass the bight round the stem of the tree. Twist the two sides of the wire together, but only just tight enough to dent the ti-tree bark with which the tree is shielded. Finally, secure the wire to the stake in a manner that it will not slip. Proceed in the same way on the other side of the tree and the job is done.

In twisting the strands of wire, see that they engage each other, not one strand straight and the other coiled around it. If this work is properly done it will last as long as stakes are needed, but the tyings must be examined occasionally and loosed if they have become tight. There should be at least half an inch in thickness of bark round the tree. Keep the wire bands about two-thirds the height of the tree from the ground.

Pruning.

When the trees have grown to 4 ft. 6 in. or 5 ft. in height, they must be "topped" or headed in. Perhaps the best height is 4½ ft. Cut down to within 1 in. of the first pair of primaries below 4 ft. 6 in. After pruning off the head, there will appear several suckers, perhaps half a dozen, shooting out from the first, second, and, perhaps, the third pair of primary branches. These must be rubbed out, or plucked out, as they appear. Sometimes this suckering will go right down to the bottom of the stem; all must be plucked off. One object of topping is to strengthen the lower limbs and fill in the tree. Coffee left to itself would grow tall and spindly, the lower branches would die out, and the top be clothed with a few green leaves on slender whip-like branches. Heading-in prevents this undesirable condition, and throws the energy of the tree into the development of its lower parts, giving it spread of branches, thus shading the ground, and, of course, producing the crop where it can be easily gathered.

The matter of pruning, how and when to do it, is a question upon which there seem to be many opinions by coffee-growers in coffee-producing countries. So far as Queensland is concerned, the writer's long experience with the crop has convinced him that much pruning should be avoided; indeed, the less the better. But Queensland's rich soils and congenial climate encourage such an exuberance of growth in coffee that a certain amount of training becomes necessary to keep it in shape for profitable handling.

The first and perhaps the most important step in pruning is to open the centre of the tree. This is done by removing all branches from the primaries growing within 6 or 7 in. of the stem. By this means a sort of cylindrical space is made into which sunlight can penetrate, and through which the air can circulate. This is not only good for the health of the tree, but flowering is induced well inwards on the branches, and picking of the crop is much facilitated. Opening the middle of the tree to light and air sometimes causes a few branches to shoot directly backwards; needless to say these must be pulled out, also any branches growing vertically upwards or downwards. It happens at times, particularly when the tree is young, and in vigorous growth, an errant branch will take a course right across the adjacent limbs. They are usually very thin, and the flowering notches far apart; pull them out as soon as discovered, as they only crowd the tree, draw sap from some other limb where it had better be allowed to flow, and they hamper the tree for picking.

On a primary there will sometimes develop a sort of notch or excrescence out of which dozens of shoots will come, and form what is called a "crow's nest," an appropriate name. Cut out the primary immediately at the back of the "nest." From the nearest eye to the stump will grow two or more shoots; remove all but one. With care this can be trained to assume the position that was occupied by the severed branch. If the tips of any of the primaries die, as they sometimes do, from overbearing, or from spells of drought when heavily laden with fruit, cut back to where the branch is green—that is, not dried up. Break out, or cut out, any dead wood as it makes. This, however, is not likely to appear till after some years of bearing, if the tree is growing under favourable conditions, and has had fair attention.

The foregoing directions for pruning, it is thought, will be sufficient for general purposes, but the observant grower may find occasion for a more free use of the knife, but, as has been said, pruning should be kept to a minimum.

Cultivation.

The cultivation of coffee is in some respects different from that of any other variety of fruit. Until the tree is nearing its third year, light scarifying may be practised, keeping the implement outside the reach of the limbs. Nearing the fourth year, surface roots begin to occupy the ground; to wound these is to seriously injure the tree. Light chipping with the hoe is best, but on no account should a cutting tool enter the ground under the shade of the branches. If the trees have been looked after their own shade will prevent much weed growth, but if weeds have got under the branches, pull them out by hand. Weeds chipped from between the trees may be pushed under the branches, using care not to contort the latter. If the grower will examine the ground under his four-year-old trees he will find it "choke full" of fine roots. These are the fruit-producing agents, to injure which is to, more or less,

reduce the size of berry and quantity of crop, and, eventually undermine the constitution of the trees.

In ordinary cases coffee flowers in Southern Queensland from mid-October to the first week in December; this may vary considerably with the character of the season. If good-growing weather, flowering may commence as early as the beginning of October and continue till the middle of November. If the season has been dry, flowers may not show till mid-December, and then only partially, but such late flowering does not often occur. Coffee makes the best of a small amount of moisture.

Harvesting.

In the localities mentioned, the berries begin to ripen in late May or early in June, and, usually, picking is finished by mid-September. Picking, however, is not continuous during this period. The early ripening, being small, is off in about a fortnight; then there is a spell of two to three weeks before pickers need go into the field again. This, the second picking, is the heaviest of the season, the weight brought in being equal to three-quarters of the season's crop. If picking has been delayed from any cause such as wet weather or shortage of pickers, there will be no break in field operations till the last of the crop is housed, which will be, in normal seasons, about the latter half of September. Under unfavourable conditions, such as a delayed start, or drought conditions, the last of the crop may not be got in before mid-December, but this very rarely happens.

Pickers are provided with bags or pockets tied around the waist and suspended from the shoulders by bands. These bags are best made of stout sail cloth about 10 in. wide and 8 in. deep. Make the back of the bag—*i.e.*, that part touching the body—3 in. deeper than the front, turn down a hem of 1 in., through this hem place a thin piece of wood reaching across the cloth but protruding from the ends of the hem, and fasten the pocket to the lath by means of a couple of tacks driven in at the extremities. This prevents the bag wrinkling up. Sew in a gore at each side, about 1½ in. wide at the top. Such a pocket holds 5 or 6 lb. when full, quite heavy enough for convenience. Empty kerosene tins fitted with cross-handles are very suitable for carrying the berries in to any place where there is a larger receptacle to be wheeled in to pulping house, or may be carried in by the packers to the place of weighing. Such a tin, full length, holds, when full, 28 to 30 lb. of berries, according to the season. The berries are ready for picking when they assume a bright red or purple tint. As soon as the beans in the berry move one upon the other when pressed firmly between the thumb and finger, picking may commence. The bright red berries are known by growers as "cherry," from their resemblance to that fruit.

Preparation of Crop for Market.

This "cherry" skin or covering has to be removed by means of a machine of simple construction called a pulper. There are various contrivances used for the purpose. A fairly effective method for small quantities is to pass the "cherry" between two wooden rollers geared together near enough to squeeze out the beans without crushing them. Under the rollers, place half a barrel nearly filled with water, place a sieve of half-inch mesh on a couple of laths resting on the edge of the tub or barrel. If water is fed with the cherry it helps the separation of the beans from the skins or "pulp." It will be needful to shake the sieve frequently. As all the beans may not have fallen through the mesh, throw the skins aside to be passed through water in another barrel. The beans will descend to the bottom by gravitation; the floating pulp may be thrown away. This method would never do where many hundredweights daily have to be worked, and is only mentioned for those with only a few trees, or for trial where there is no machine within reach. The two principal systems adopted are the disc and the breast-pulpers. The former is an iron disc revolving vertically. This disc is covered on one or both sides with copper, upon which are embossed rounded protuberances of various shapes; in some machines rounded, in others oval, and in still others, crescent-shaped. These elevations are close together and raised about one-eighth of an inch. The cherry is placed in a hopper from which it is guided by a cast-iron chop on one or both sides, placed near enough to the disc to crush the berries, but far enough off to allow the skin to pass between it and the chop. The cleaned-out beans escape in another direction. The "breast" pulper is a cylinder or drum 12 in. face and about the same in diameter. This drum is covered with copper, perforated something like an arrowroot grater, or with similar-shaped knobs to the disc pulper. The drum is mounted on a strong frame; in the front of it, and resting on the frame, to which it is fastened with bolts, is a bar of iron presenting a square face to the drum of about 1½ in. The opposite side of the bar is chamfered away, leaving the thin edge on top. This thin edge is perfectly level and kept sharp. When pulping is proceeding, this lower chop is placed near the face of the drum, so close as to allow the skin to pass, only, say, not further away than one-sixteenth of an inch at most; generally a little less

will do. If the distance between the chop and the cylinder is too great, the beans would be liable to be damaged. Above this chop is fastened a second chop, or "breast" bar, the lower edge of which is placed about three-eighths of an inch above the sharpened edge of the lower chop, its width is usually 4 or 4½ in., the face against the drum, square, and closest at the lower edge, close enough to ensure the crushing of berries passing between it and the drum. A hopper is fixed above the drum, into which the "cherry" is placed. A chute is provided to convey the berries to the open space between the upper edge of the top chop and the drum; the latter, revolving, draws the berries downwards, the beans passing out from between the chops and the skin passing down behind the lower chop and along a chute to the back of the machine. The beans fall into a perforated sieve, the holes being large enough to pass the beans but to retain any unpulped beans and skin which must be returned to the hopper to go through the machine with fresh "cherry." For good, clean work, pulping should be done on the day of picking, or next day at latest. Water must also be freely used with the berries in pulping to facilitate the separation of the beans from the pulp, &c. Between the outer red skin and the inner "parchment" is a quantity of viscid matter which must now be got rid of, or the coffee will not dry properly. It would be sure to become mouldy and spoiled for sale. To remove this viscid substance, the beans must pass through a fermenting process, which is accomplished in the following manner:—

The beans, fresh from the pulper, are placed in a receptacle such as a wooden tank, box, or barrel. After twenty-four hours or so, acetous fermentation should have converted the viscid substance into a vinegary sort of fluid, easily washed away from the coffee. The time needed for this change, however, will vary with temperatures. If the weather is cold, the writer has found the addition of a little warm water, and covering the vats with a few sacks, advantageous. To ascertain when the coffee is ready for washing out, dip out a quart or so from one of the vats and wash it well with clean water; if, after so washing, it is found to feel "gritty," having lost all feeling of slipperiness, it may be washed out. The cleansing should be continued till the water comes off quite clear. Remove all floating beans and skins, if any, by means of a skimmer, or they may be rushed over the end of the washing tank, or vat, into an empty vessel placed to receive them. After washing, the coffee must be placed in trays having bottoms of small-mesh woven galvanised wire, or perforated zinc, and sides of 3-in. wide pine battens. Stands for the trays may be made by driving stakes firmly into the ground at suitable distances apart, perfectly in line, and quite level, one with the other, on the tops. The lines should be in pairs, placed sufficiently far apart to carry the trays, allowing for 2 or 3 in. projection at each end of the trays for convenience of lifting. Nail a 3-in. batten to the stakes, edge up, along the top of any convenient length, say, 15 ft. This can be repeated, of course, to accommodate any number of trays. A shed or cover of some sort should be near the stands under which to place the coffee at night or in case of rain.

During the process of drying, the coffee should not lie deeper than 1 in. to 1½ in. on the trays; if there is no stint of the latter, and there is drying room enough, it would be better to spread the beans down to less than 1 in. in depth. To ascertain when the coffee is dry enough to be taken into the store, try a bean or two by pressure of the thumb nail, or between the front teeth. If either make an indentation, it is not quite ready for housing. After a little experience, the stage of dryness may be judged by the colour, which should be an even, slaty blue, but the thumb nail and teeth first, the other will come by practice. It sometimes happens, through unsuitable weather, and shortage of trays, that the coffee must be taken in. This may be safely done if the beans have shrunken from the parchment skin, and are spread thinly on the storeroom floor, and turned over daily till an opportunity offers of completing the drying in the sun.

It usually takes six or seven consecutive days of sunshine to thoroughly dry the coffee, during which time it must be frequently turned not less than three or four times daily. This ensures even drying, and will gain fully a day in the time of its exposure; it also secures other desirable ends.

The next and final stages in the preparation of the beans for the market is "hulling" or peeling—that is, the removing of the "parchment" and "silver" skins. This latter is a fine tissue lying betwen the parchment and the bean. There are several ways of accomplishing this removal of the covering of the beans. One way is to bruise or crush it off under a revolving roller fitted in a basin very similar to a mortar mill. Care is taken that the roller, or wheel, does not come into immediate contact with the bottom of the trough or basin. Another machine for the purpose, and the one in general use, is constructed much on the principle of an "Enterprise" meat mincer, a tapering spirally corrugated cone revolving in a similarly tapering and corrugated cylinder. The coffee is fed into this cylinder and forced forward to its smaller end. Much pressure and friction is exerted. A spring or weighted valve is fitted at the exit, through which the hulled and polished beans

pass. A fan blows away the chaff. The beans are then passed through a grading machine fitted with a series of sieves. It is here graded into sizes, the pea-berry separated from the "flats" and any broken beans removed. This operation finished, the coffee is bagged, and is ready for market. Hulling, grading, and especially the difficulty of getting the coffee beans into a market where they may be placed before buyers of quantities, have acted as deterrents to the progress of coffee cultivation.

It is not claimed that all has been said about coffee-growing that can be said. The writer's aim has been to avoid redundancy, and yet make plain as possible what was considered essential to assist and guide the would-be coffee-grower. Nothing has been put forward that has not been tested during nearly thirty years' experience in Queensland. Naturally, there will be differences in details in different localities—meteorological conditions, quality of soil, situation of plantation, &c.; but general principles of cultivation are the same pretty well all over the State.

It must also be borne in mind that what has been written has been intended for the small grower; hence no elaborate calculations as to the cost of establishing a big estate have been given. For one reason, it would not be advisable to open up extensively for coffee unless an adequate supply of suitable labour could be depended upon for picking. A small farmer could easily add 2 or 3 acres of coffee to his cultivation with the help of several juveniles for the harvesting only, and, as stated, it is with the especial object of assisting such men that these notes are presented. At the same time, anyone in a position to do so, and wishing to go into coffee-growing extensively, may depend upon the accuracy of its details, with the added value to Queenslanders that the information imparted has been accumulated in Queensland.

YORKSHIRE PIGS.

(With Special Reference to an Overseas Shipment of Large Yorkshires.)

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

There are three distinct types of Yorkshire Pigs (or White Pigs, as they are commonly called), known respectively as the Large Yorkshire or Large White, the Middle or Medium Yorkshire or White, and the Small Yorkshire. Of these, we have in Australia a fairly large number of the Middle York type, one or two very small studs of Large Yorks, and none of the Small Yorkshires at all now. The reason why the Small Yorkshire failed to prove profitable here—and they were given a very fair test years ago—was because they were too small and chubby, too lethargic, fat, and soft for Australian conditions, they could not stand up to our comparatively warm climatic conditions, and they were not prolific or active enough for the rougher conditions in many of our dairying districts. They are essentially of the "Poodle," the "Pet Doggie" type, and are suited alone to the better conditions in the Old Land when in the hands of folks of means, who can provide for their extra comfort, irrespective of whether they are commercially profitable or not. Even there they have failed to retain their popularity, and one seldom hears of a Small Yorkshire pig now.

The Middle Yorkshire has had an excellent reputation for many years, particularly in Victoria, in the south-western portions of New South Wales, and in South Australia, but to a much lesser extent in the far West, in New South Wales generally, and in Queensland; though it must be admitted (even if reluctantly) that they have not held pride of place here in recent years, during which the Berkshire has become increasingly popular and the Tamworth and Poland-China have forged ahead in quite a remarkable manner. In Queensland in particular we find that they have failed to keep pace with the times in so far as their reputation goes, and while the number of breeders and exhibitors at our principal shows in Berkshires, Tamworths, Poland-Chinas, Duroc Jerseys, and, more recently still, in the Gloucester Old Spot, has increased very considerably, we have but one or two exhibitors of Middle Yorkshires and no Large Yorkshires at all.

Nevertheless, it must be said in favour of the Middle White that, given reasonable conditions, careful handling, and sufficient protection from the effects of severe weather, they have proved to be a type of very considerable value in the industry.

It is a strange thing, yet it is nevertheless true, that while the Large Yorkshire has forged ahead overseas and, as this report will show, are selling like "hot cakes," they have not become a popular pig here at all, and it is doubtful if one could find one hundred head of Large Yorkshires in the whole of Australia, and we have a pig population now of well over one million head. This also is not because there is anything decidedly wrong with this large type. It is solely because they do not

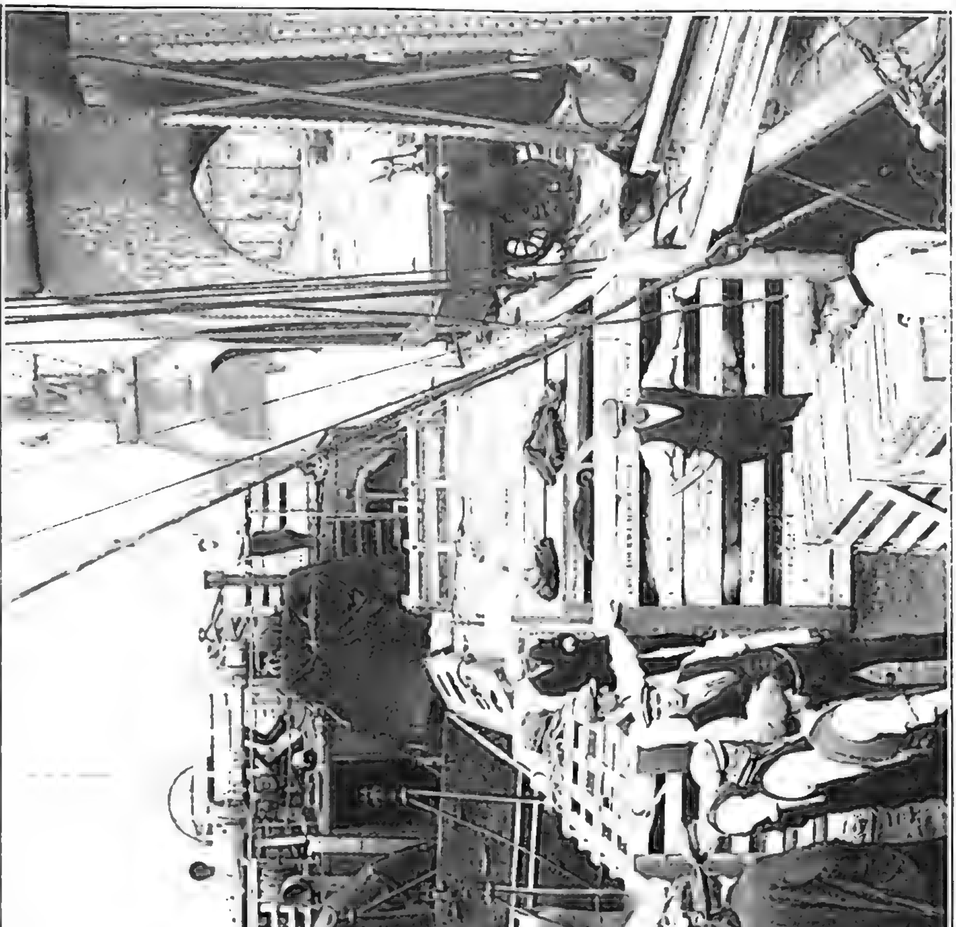


Plate 94.—Part of the Consignment of 200 Pedigree Large White Pigs, Purchased by the Russian Government from Members of the National Pig Breeders' Association, has been Shipped from London to Leningrad per the s.s. "Loos."

Very high prices were paid for the pigs, one 18 months old boar realising £250 and another £150.

suit our conditions, our markets requiring very early maturing, light to medium weight, and fleshy well-streaked pork and bacon pigs, while the demand for larger type pigs for crossbreeding purposes with Berkshires and other medium breeds is being successfully met by the hardier Tamworth, of which we have some very excellent specimens in this country. There is indeed little or no hope for the Large Yorkshire here, for as competitors they would also have to face the British Large Black (and the enthusiasts of this type are pushing their favourites into many new districts), the Gloucester Old Spot, quite recently introduced, and, as it were, now well in on the ground floor but with a rather severe uphill fight ahead to gain prominence in our show rings and saleyards, and, perhaps, the Duroc Jersey. The special object of this article, however, is not to argue one way or another in regard to the Yorkshire types. It is to give prominence to a remarkable shipment of Large Yorkshires from England to Russia, particulars of which, as supplied by Mr. Alec. Hobson, Secretary of the National Pig Breeders' Association of England, are as follows:—

"On a recent Saturday the s.s. "Loos" left London Docks for Leningrad, Russia, with no fewer than 140 Large White pigs on board, including an eighteen-months-old boar that cost 250 guineas, and several others purchased for more than 100 guineas each. More are to follow, so that ere this (October, 1925) some 200 of England's choicest pedigree boars and sows—all Large Whites—will have left England's shores to improve the standard of the Russian pig, thus indicating once again the popularity of and world-wide demand for this old-established breed, for surely it is a very old but very true saying that England is the stud farm of the world.

"The pigs comprising these shipments have been selected from quite a large number of breeders, the largest individual selections being made from Messrs. Chivers and Sons, of Histon, who supplied six boars and twenty-five sows, and from Alfred N. White, of Spalding, who supplied twelve each boars and sows. Each pig shipped was accompanied by a pedigree export certificate issued and verified by the National Pig Breeders' Association. The value of such certificates to the new owners has to be realised to be appreciated. They will doubtless be framed, and who knows that in years to come if and when the Russian pig industry is on an equally sound footing to the Danish, these self-same certificates will be referred to as the genesis of their herd books."

"It is common knowledge," says Mr. Hobson, "that in Denmark, when the Danes, in building up their bacon industry, recognised that the essential to success was to produce the right animal, they decided after careful investigation to import the Large White as the most suitable pig for their purpose." Mr. Hobson wonders whether history is repeating itself in the case of the Russian shipments.

To Queenslanders this illustration will be of the greatest interest, though, as already stated, up to the present the Large White has not proved suitable for our conditions.

A SIMPLE METHOD OF MAKING CONCRETE POSTS.

Thus a correspondent to the "New Zealand Journal of Agriculture":—

"In your February issue there is an article on making concrete posts for farm work, in which the writer gives particulars for making the boxes, &c. Another method, which perhaps does not make such a neat post, but which answers very well, is as follows:—Select a spot of old pasture with a good, firm sole of grass and solid subsoil. With a very sharp spade dig out a trench the size of the post required. If the ground is firm the sides will stand all right without boards or support.

"Then line the trench with stout tarred paper, old clean sacking, or other material to keep the concrete from the soil. Mix the concrete as directed, and put in the reinforcements as necessary. Before putting in the concrete, I lay two or three pieces of No. 8 wire across the trench, and bend them to the sides as close as possible, leaving about 18 in. of wire projecting above the trench on each side. After the posts are made, cover with a wet sack or straw, or any waste material, to keep the sun and frost away, and leave for a month or more to mature. When the posts are ready the wires are brought together, twisted, and a crowbar or the like passed underneath. A couple of men can then lift the post out into a dray or cart. By leaving the posts in the ground they are kept damp and do not dry too fast in the sun or wind."

Concrete posts are neat, efficient, and durable, being unaffected by white ants or rot, and probably also by bush fires, though their first cost makes their use uneconomical in districts where wooden posts are still easily obtainable. Concrete gate posts have decided advantages over wooden ones. Unsightly cracks do not appear in them, nor do they require painting regularly to keep them in good order.

MARKETING PIGS IN QUEENSLAND.—V.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The marketing of his products is claiming much closer attention from the man on the land, and in this series Mr. Shelton describes how the farmers' pigs are handled at the selling end. In previous instalments several marketing systems with which Queenslanders are familiar were reviewed, and in the fifth article are many points of equal interest to the wide-awake pig-raiser.—Ed.

Weighing and Paying.

Bacon pigs, as well as porkers, are purchased largely in this State and are paid for on a basis representing their estimated dressed weight—this in the case of pigs purchased by the several proprietary interests—and on an actual dressed weight basis in the case of pigs going forward direct to the co-operative factories.

In the former the pigs are actually weighed "over the scales" at country railway stations and sale yards, by buyers representing these proprietary firms, who, after thus ascertaining the live weight of each animal, makes a deduction on a sliding scale varying from 25 to 32 or 33 per cent.—as representing shrinkage and offal—and pays for the pigs on the thus estimated dressed factory weight, while in the case of the co-operative factories the pigs are "received" and trucked by an official loading agent or representative and are not paid for until they are slaughtered, dressed, cooled, and actually weighed at the factory, the weight including head, tongue, kidney fat, and feet as attached to the body.

Each week the factories supply their buyers, representatives, or official loading agents with the weekly schedule of weights and prices which are current at that particular time, and it is on the basis of these weights and prices that the pigs are accepted and paid for.

At the moment (21st September, 1925) the Queensland Co-operative Bacon Association Ltd., at Murrarie, are paying for bacon pigs on the following schedule:—

Prime baconers, dressed weight, 95 lb. to 125 lb., 8¼d. per lb.; 126 lb. to 135 lb., 7¼d. per lb.; 136 lb. to 145 lb., 6½d. per lb.; 146 lb. to 160 lb., 5½d. per lb.; 86 lb. to 94 lb., 7½d. per lb. Pigs other than prime according to quality.

Porkers, 6¾d. per lb.; sows for small goods (prime), 4d. per lb. Prices for others according to quality. Stags, 1d. per lb.

Boars, large or small, not received and stags must be emasculated at least three months before forwarding to factory.

These weights and prices may and probably do vary slightly with the different companies, but they are representative of the scheme of buying, though in this case the pigs are paid for on an actual dressed weight basis and are not usually weighed at all by the companies' officials prior to slaughter.

Nevertheless, the point of particular interest to the pig raiser is that the pigs are, in each instance, paid for on a "weight" basis, the actual price paid also varying, of course, with the quality of the animal, though many argue that insufficient attention is paid to quality and type.

Another Point of Interest.

Now another point of interest is that the bulk of our farmers have no conveniences for weighing their pigs, consequently there is considerable misunderstanding and endless discontent. One farmer informed me recently that he had been "robbed" by the pig-buyer on scores of consignments; another complained that farmers had little or no idea of weights or of the factories' requirements, for he said one lot of prime baconers he sent in were reported upon and paid for as being too fat and heavy. So to be sure of it he made certain that the next lot were sent in on the light side, with equally disastrous results, for they were not fat enough and were less than "eighties."

Suppliers to co-operative factories are here and there agitating to have scales installed at their trucking yards, while in many instances farmers who have the benefit of scales at the yards have little or no confidence in the buyers, are suspicious, and still think they are losing heavily. Conditions were much like this years ago in

our butchers' and grocers' shops, but this feeling has almost entirely disappeared nowadays, when one sees attractive, open-faced, and well-regulated scales on almost every counter.

So a great deal of the misunderstanding and discontent among pig-raisers could be avoided if farmers will install scales on their farms, by means of which they could weigh their own pigs at regular intervals, as well as immediately prior to despatch, thus becoming better acquainted with the actual weights of their animals at different periods. Local Producers' Associations might take this matter up and arrange for the co-operative purchase of scales, which could be located at convenient spots for the purpose. Some simple system of deduction by means of which they could at least be able to run fairly close to factory weights could be adopted, though it must always be remembered that pigs shrink or lose weight somewhat in transit, this shrinkage being heavier in the case of pigs travelling a long distance, as well as in the case of pigs that have been slop or milk fed and have not been properly "topped up" on grain, so that due allowance would at all times have to be made for a variation in weight from farm to factory. This is why the proprietary interests have adopted a sliding scale of deductions, for their experience has demonstrated that lighter-weight slop or purely milk-fed pigs lose much more in transit and slaughter than heavier grain-fed pigs, though unless carefully handled the latter may also suffer through being paid for at a lower price, owing to being overfat and too heavy.

A fairly accurate basis can be arrived at in Queensland by deducting 30 per cent. from the actual live weight, and a very simple system of doing this is figured out as follows:—

For pigs weighing 160 lb. live weight, multiply live weight by the figure seven and cross out first figure from right, thus:—

$$\begin{array}{rl} 160 & \text{lb. actual live weight} \\ 7 & \\ \hline 112\cancel{0} & = 112 \text{ lb. estimated dressed weight,} \\ & \text{or 30 per cent. less than actual live weight.} \end{array}$$

This is the simplest form of arithmetic and should not puzzle any farmer, while being fairly accurate as a guide.

Bacon Pig Weight-grading Machine—A New Invention.

To at least make an attempt to overcome these losses and heartburnings and to place in the hands of the farmer a reliable machine at a reasonable price, there has recently been marketed a contrivance, a patent for which has been officially applied for, known as "Forster's Weight-grading Machine."

The machine itself is constructed on the principal of a farm slide, to which a horse could be attached to move the machine about as required. The illustrations show the details clearly and will enable readers to study the principle of the machine.

Fig. 1 shows the outline of the framework and the handle-bar which connects to movable gear, by means of which the pig crate (see Fig. 2) is raised when it is desired to connect same to the set of clock-face scales shown in Figs. 3, 4, and 5. The connection between crate and scales is movable, so that if the pig insists in squatting in one corner of the crate and not equalising the balance, the adjustment of this connection overcomes the trouble and enables weighing to proceed just as if the pig were in the centre of the crate.

Fig. 6 shows the machine with the sliding door at end of crate, ready for action. The door at the other end is also movable, so that, after weighing, the pig simply walks out of the crate and leaves the way open for the next pig to walk in. A small ramp has since been added to the machine to allow the pig to walk up the short incline from the ground into the crate.

The machine complete weighs approximately 3 cwt., and full instructions regarding its use, the various details of construction, and price may be obtained on application direct to Mr. Forster at his city address. The measurements overall are as follows:—Width 3 feet, height 5 feet 6 inches, and weight approximately 3 cwt.

The machine was in use at the Nambour Show in July, and again at the Royal National Show, Brisbane, in August, and was of much value for the purpose of weighing various pigs. It is a necessity on any well-conducted pig farm, and the price should not be the only consideration when considering its purchase, for one would soon lose more than its nominal value in a few consignments of over or under weight market pigs.

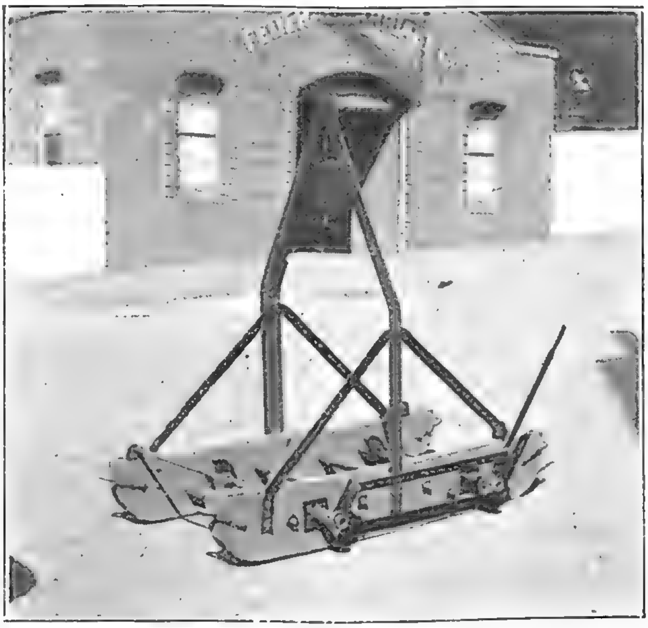


Plate 95 (Fig. 1).
Forster's Weight-grading Machine for Bacon or Pork Pigs, showing Construction of Framework.

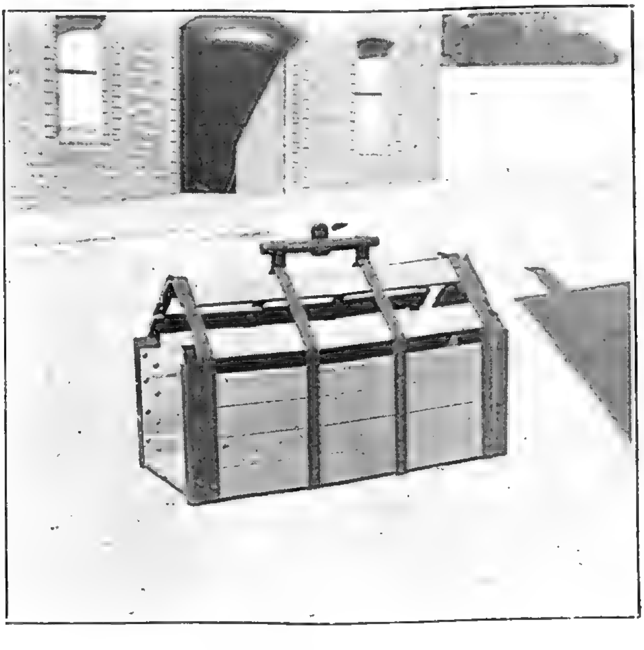


Plate 96 (Fig. 2).
Forster's Weight-grading Machine, showing Pig Crate having movable doors at each end and slatted floor to prevent Pig slipping when entering or leaving.

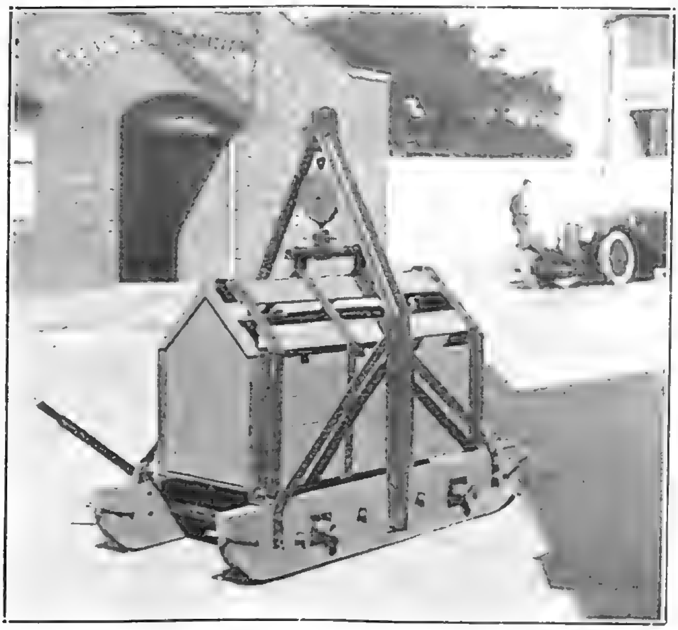


PLATE 97 (Fig. 3).

Showing the Crate connected with the Spring Balance Open Face Scales. Note also the doors closed at each end of Crate.

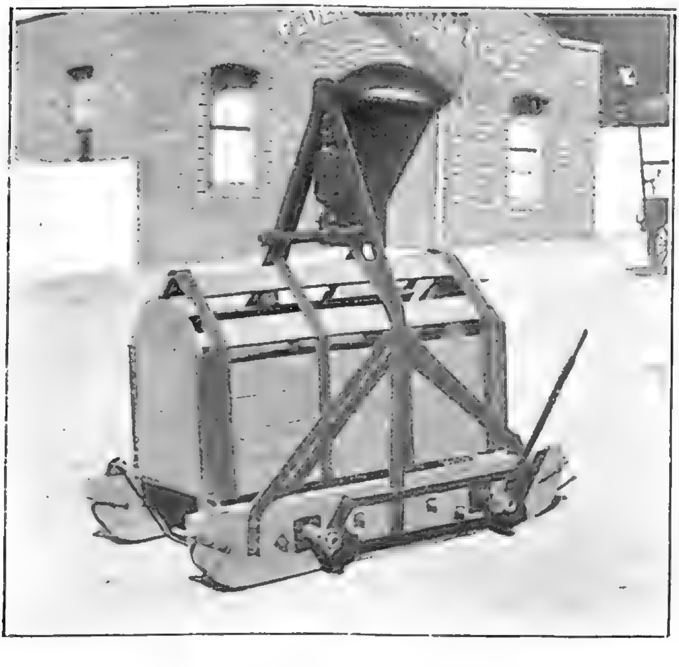


PLATE 98 (Fig. 4).

Reverse view of Fig. 3.

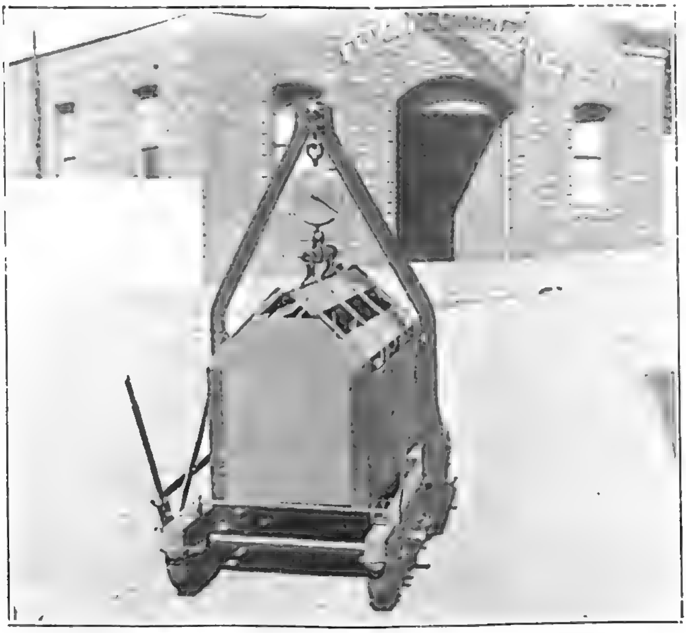


Plate 99 (Fig. 5).
The machine complete, ready for use.

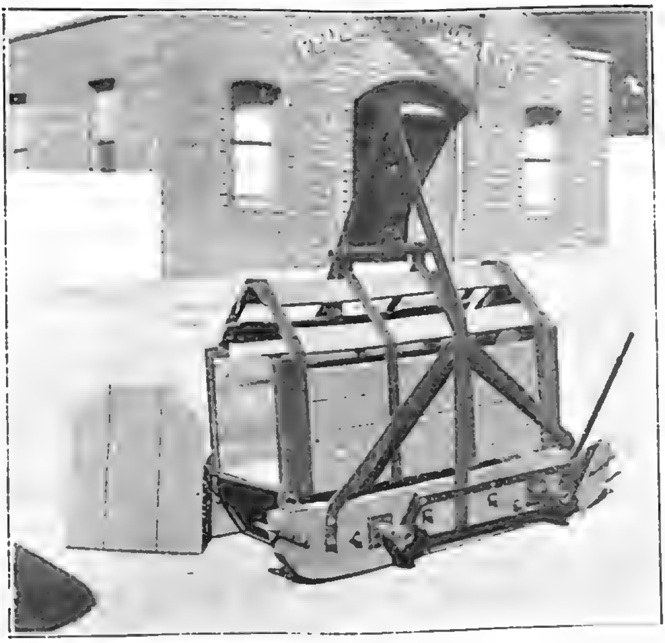


Plate 100 (Fig. 6).
Another view, showing machine ready for use and crate open ready to receive pig.

PARALYSIS OF THE HINDQUARTERS IN PIGS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

In the course of recent tours both in the Northern and Central Divisions as well as in Southern Queensland, and also during a lengthy experience in New South Wales, Mr. Shelton has noticed a considerable number of pigs suffering from the trouble most frequently spoken of as Paralysis of the Hindquarters. This disease is also, on occasions, erroneously referred to as Staggers and Rickets, while other terms used to indicate a similar condition are, Down in the Back, Kidney Worms, or Paralysis. Mr. Shelton's notes on the subject are of unusual interest.—Ed.

Numerous inquiries have been made as to the cause of this all too common and very peculiar disease, if such it might be called. The subject has been referred to previously in these columns, but being of such a serious nature warrants repetition, especially as quite recently several very helpful communications have been received from correspondents overseas having special reference to the subject matter.

A great deal has been written regarding "Paralysis of the Hindquarters in Pigs" and much research work has been carried out, principally with a view to ascertaining the exact nature of the conditions under which the disease occurs, and in studying the subject it is of interest to know just what other authorities are doing, and to determine whether or not their findings are applicable to our conditions in Queensland.

The disease is very largely one due to a deficiency of mineral matters in the food and to malnutrition, hence the writer's objective is to suggest how by improved methods of feeding and caring for pigs these abnormal conditions can be overcome. The Veterinary Officers of this Department should be consulted on all matters relating to medicinal treatment; their advice is also always available in case of any outbreak of disease no matter whether it be of a minor or of a more serious nature.

Paralysis of the Hindquarters in Pigs is, unfortunately, a trouble not confined to young pigs only nor is it localised in Queensland. It appears to be a source of considerable trouble wherever pigs are kept the world over, though where the conditions under which pigs are kept are favourable to early maturity and to the healthy and rapid growth of all breeding stock, the disease has been kept in check and has caused but little trouble.

Professor L. A. Maynard, of the New York State College of Agriculture, Department of Animal Husbandry, has written on the following lines as a result of his experience:—

"This problem has been under investigation here for several years. On the basis of our studies, we believe the trouble is the result of improper mineral nutrition which prohibits a normal development of bone. This is due to a lack of calcium in most of our rations. We have shown that where paralysis occur, the long bones are very deficient in calcium and phosphorous, and marked histological changes have occurred. These changes have been observed on a diet low in calcium. However, a lack of calcium is not the only factor involved, because the question of assimilation also comes in.

"Certain feeds are rich in the factor aiding mineral assimilation, and certain others are not. A ration which contains a certain amount of chopped alfalfa (green lucerne or lucerne chaff) is very useful for preventing paralysis, because it supplies the needed calcium and phosphorous and the factor aiding assimilation as well. We have shown, however, that there is a very beneficial effect from the adding of ground limestone and bone meal to rations which are now causing the trouble."

In a communication from Professor R. Adams-Dutcher, Head of the Department of Chemical Agriculture at the State College and Experiment Station, Pennsylvania, U.S.A., the following remarks appear:—

"I have the feeling from the knowledge that I have been able to obtain by reading, and in experimenting, that the diet is a very important factor in preventing paralysis in pigs, and probably calcium and phosphorous accompanied by proper vitamin-carrying foods are the most important dietary factors. Any number of animals have been relieved of the paralytic symptoms by feeding bone meals or other mineral mixtures carrying calcium and phosphorous; mixtures which carry

calcium carbonate have also been effective. Veterinarians in New York have had fairly good success with wood ashes, but it is my recommendation that lime or bone meal be made available in those districts where hog paralysis is causing trouble. If lucerne or some other leafy greenstuff or hay is available, this would also improve the situation, helping the animals to utilise this mineral matter to the best degree of efficiency.''

The following extracts have been taken at random from mimeographs supplied by Professor John M. Evvard, as a result of extensive experiment along the lines of feeding mineral mixtures, both simple and complex, to pigs not only with the idea of preventing paralysis, but of stimulating growth and enhancing the returns.

Comment.

(1) The feeding of minerals in whatever form allowed was quite advantageous in that the average daily gains were substantially increased, the length of the feeding period economically shortened, the feed required per 100 lb. gain considerably reduced, and the profits per pig enhanced.

(2) In feeding experiments the appetites of pigs for minerals is shown to be of considerable reliability, inasmuch as they clearly excelled check groups receiving no minerals.

(3) Although there appears to be some advantage gained from the feeding of a mineral mixture carrying more than the single emphasised ingredients, such as common salt, calcium carbonate, bone ingredients, and potassium iodide, yet just how far one can afford to go in the adding of other ingredients in practice is a matter for individual estimation and determination. Our experience has certainly indicated that some of the main ingredients necessary in the mineral mixtures are those that carry sodium and chlorine (common salt), calcium (lime, limestone, and bone materials), phosphorous (bone materials, rock, and other phosphates), and iodine (Potassium or sodium iodide). The further addition of suitable combinations of such ingredients as common sulphur, a little charcoal, some Glauber's salts, as well as some other ingredients in small percentages or quantities has, on the whole, shown some benefits in our experimental work.

(4) It appears as if the farmer in his feeding of sulphur, charcoal, and other often-questioned materials has not gone entirely wrong, and like his well-founded belief in yellow corn (as against white corn), we should be sure of our grounds before declaring them or any of them non-beneficial.

(5) Our other work with minerals has shown the dollar and cents practicability of adding a good mixture of mineral ingredients to many ordinary pig rations.

(6) Our general recommendation is to provide a suitable mineral mixture for all classes and grade of pigs—the growing pigs, the breeding sow, the suckling pigs, the boars and all—and it is our suggestion that the mineral mixture be self-fed in an easily accessible place, well protected, and under shelter if possible.

(7) A good mineral mixture may be made up for practical everyday feeding as follows:—

> Common salt, 20 per cent.; finely ground raw bone meal, or steamed bone meal, or spent bone black, or rock phosphate, or acid phosphate, 40 per cent.; finely ground high calcium limestone, or wood ashes, or finely ground oyster shell, or lime thoroughly air slacked, 40 per cent. Total, 100 per cent.

If sulphur is desired, add approximately 10 lb. to the 100 lb. To every 100 lb. of the above minerals, and from ½ to 1 oz. of potassium iodide, mixing all ingredients thoroughly.

The following remarks upon this disease form the conclusions arrived at by Dr. J. W. Connaway, a prominent American Veterinarian, who has been associated with many of the experiments relating to this particular trouble:—

Paralysis of the hindquarters in pigs may result from one of several causes, and the treatment will vary to some extent, according to the cause of the paralysis. The causes are—(1) Injuries; (2) impaction of the lower bowels; (3) kidney worms; (4) heavy suckling; and (5) lumbago or rheumatism. Each of these causes and the preventive and curative measures are discussed in order as follows:—

Paralysis from Injuries.

If the pig has been running in the same yard with horses, mules, or cattle, it may have been kicked, pawed, horned, or trodden upon, and sustained an injury to the spine, legs, or muscles of the back or hips.

Treatment.—Make a thorough examination of these parts. Sometimes an injury is deep-seated and can be detected only by firm pressure and other manipulations of the paralysed parts which produce evidence of pain, fractures of bones, or rupture of tendons and muscular tissues; or the pressure of deep-seated abscesses. If the paralysis is due to an injury, the best treatment is absolute rest. Put the patient under shelter in a comfortable pen, where it can be bedded and kept quiet. Feed a light laxative diet and keep the pen and bedding clean. After a time, a stimulating liniment rubbed over the injured parts may hasten recovery. A mixture of equal parts of turpentine, ammonia, and cotton-seed oil makes a very good liniment. An abscess should be opened and be given proper antiseptic treatment.

Paralysis from Impaction of the Bowels.

Paralysis of the hindquarters may result from an impaction of the lower bowels with hard masses of dung, causing excessive pressure upon the nerves and blood vessels in the pelvis or hip region. If the paralysed pig seems to be badly constipated, use rectal injections of warm water to soften and remove the hard lumps of dung. Add a couple of tablespoonfuls of Glauber's salts to slops (food) and feed twice daily until the bowels are loose. Impaction is most frequently due to improper feeding, and to lack of tone of the bowels. A properly balanced ration with an adequate supply of water will prevent impaction of the bowels. In cold weather, pigs frequently do not have a proper supply of water. If the water is icy cold, pigs do not drink a sufficient quantity and are liable to become constipated. Some provision should be made for warming the water to take off the chill. A warm slop once a day will be helpful in keeping the bowels of the brood sow in good condition.

The following tonic will also be found useful:—Equal parts of pulverised copperas, Glauber's salts, Sal. soda, common salt, and a double portion of powdered charcoal, which should be thoroughly mixed and put in a covered trough (self-feeder), where all the pigs can have free access to it.

Paralysis from Kidney Worms.

The so-called kidney (or lard) worms "Stephanuus dentatus" (also called "Sclerostoma pinguicola") may cause paralysis of the hindquarters if these worms are present in large numbers in the sublumbar or loin region. These worms, in the embryo stage, migrate into the fatty tissues around the kidneys, and sometimes into the kidneys and other organs, as the liver and pancreas. They produce inflammation, and at times abscesses, in the tissues where they lodge. As they are found in largest numbers in the kidney fat and loin region where the nerves are given off from the spinal cord to the hindquarters, the functions of the nerves of this region are more likely to be affected by these parasites and their toxic products.

Treatment.—A brisk rubbing or massage of the loin muscles, with an application of the liniment already mentioned to stimulate the nerves and increase the blood circulation of the affected region will be helpful. Turpentine should also be given internally; this will destroy many embryo worms in the intestines. As turpentine is very diffusible, it is believed to be useful in destroying these parasites in the tissues around the kidneys. To a 200-lb. pig give a tablespoonful of turpentine in half a pint of oil (cotton-seed or raw linseed), or warm milk may be substituted for oil. Shake well before using. Use a small-necked bottle, drenching horn, drenching bit, or old leather shoe with a small hole cut out in the point, and give the drench slowly, or smaller doses may be added to the slop (food). The following worm remedy is also useful:—Santonin 6 grains, Calomel 4 grains; this quantity to a bacon pig 100 lb. live weight or twice the amount to a pig weighing 200 lb. or more live weight.

In every case, the bowels should be completely emptied before the medicine is given. The Santonin (or Areca Nut may be used in similar quantities) and Calomel should be mixed thoroughly with a small quantity of dry meal or shorts (pollard), which may then be moistened and fed alone, or the meal and medicine may be stirred into a feed of slop. Repeat the treatment in a few days.

As a preventive, use freshly slacked lime liberally over the pig yards to destroy worm embryos on the ground over which the pigs feed. Give the pig yards a thorough liming and clean up several times in the year.

Paralysis from Heavy Sucking.

Brood sows that do not have a proper ration, or that are not able to utilise it effectively, sometimes go down in the hindquarters from suckling a big litter of rapidly-growing pigs. The rapid growth of the pigs requires considerable protein for muscle building and considerable bone-making material. All this must be supplied

through the milk of the mother, and if the sow is not given the correct ration, her own muscles and bone tissues are depleted to supply proper elements for the growth of her pigs and the weakened condition mentioned results. This can usually be prevented by giving a food rich in protein and bone-making materials along with a corn ration. Protein supplements, such as "tankage" (meat or blood and bone meal), and linseed meal, should be provided. Protein may also be supplied by leguminous crops—clover, alfalfa (lucerne), cowpeas, and soy beans. Brood sows that have access to a feeding rack that is kept full of "pea green" lucerne or other legumes will have no trouble in supplying their pigs with both muscle and bone-forming materials, and will not be in much danger during their lactation period of going down in the hindquarters from too heavy a drain on their tissues. A little crushed wheat or corn and bran made into a slop with buttermilk is an excellent prescription, especially for sows that are low in condition from suckling large litters of pigs. Heat the milk nearly to boiling point for a few minutes before adding the grain constituent; this will prevent any possibility of transmitting tuberculosis or other diseases to the brood sows through cow's milk.

Paralysis from Lumbago or Rheumatism.

A board off the pig pen may permit a cold draught to blow on the back of the pig at night. This chilling of the loins may produce lumbago, or temporary paralysis of the muscles of the hindquarters and inability to walk. Comfortable sleeping quarters prevent these troubles (as well as pneumonia, &c.). It is a mistaken notion that the thick layer of fat with which pigs are provided is sufficient protection against winter storms. On the contrary, pigs often suffer severely from cold and wet if not properly sheltered and properly bedded. If the pigs are affected with lumbago and rheumatism, clean out the bowels by means of a brisk purge (two to four tablespoonfuls of Glauber's or Epsom salts administered in a pint of warm water). Cut down the protein constituent of the ration; feed thin, warm slops to which baking soda is added in tablespoonful doses. Apply hot packs to the loin and paralysed limbs, massage the muscles and apply a stimulating liniment with brisk rubbing. Bed warmly and cover the body of the patient with a thick horse rug if the weather is cold.

A Peculiar Ear Disease Possibly Mistaken for Paralysis.

Reference was made in the November (1924) issue of the "Queensland Agricultural Journal" to investigations that have recently been carried out by H. R. Seddon, D.V.Sc. and H. R. Carne, B.V.Sc. of the Veterinary Research Station, Glenfield, New South Wales (as reported in the "Agricultural Gazette" of New South Wales, June, 1924), these investigations having as their objective the determination of the cause and effect of a peculiar disease technically known as suppurative otitis affecting the ear of the pig, the principal symptoms of which are the abnormal carriage of the head and the interference with equilibrium and sense of direction. This disease which, unfortunately, also is all too common in Queensland and is frequently mistaken for paralysis or as indicating the development of paralysis of the hindquarters, has been described by these veterinarians as follows:—

A condition has been noticed fairly commonly amongst young pigs in which the most prominent symptom is a peculiar alteration in the carriage of the head, which is accompanied frequently by unsteadiness of gait. The disease is seen usually in young pigs from a few weeks up to three or four months old. The reason for the relative infrequency of occurrence in older pigs is possibly that young pigs are more prone to catarrh (which appears to be the forerunner of the condition) and that affected animals suffer such loss of condition that they die or are killed as "runts" or "bad doers."

Symptoms.

The most characteristic symptoms are the abnormal method of carriage of the head and the interference with equilibrium and sense of direction. The head is twisted or rotated to one side or the other so that one ear (the affected one) is depressed, such depression becoming more marked as the condition advances. It is noticed that the animal, when walking about, tends to circle in one direction, this being towards the side to which the head is depressed. For example, if the left ear is affected, the head will be rotated to the left with depression of the left ear and "circling" will occur in the same direction. At times this tendency to circle is not apparent, but it is noticed that when moving, the animal does so with an awkward gait, whilst the head is moved from side to side in an unbalanced manner. Affected animals may also exhibit considerable difficulty in going straight up to the feeding trough, having to make several attempts before gauging the right direction, sometimes walking to one side of the trough and sometimes to the other. It has frequently been noticed that the condition is accompanied by discharge from the nostrils and eyes.

In advanced cases there are very apparent disorders of equilibrium, the gait becoming unsteady and somewhat inco-ordinated, and the animals may fall into the feed trough and be unable to get out again.

Affected pigs are usually found to be "poor doers" showing a scurfy condition of the skin, lack of lustre of the hair, and poor condition. The appetite is capricious. In some cases examination of the affected ear reveals a considerable amount of yellowish brown or brown sticky discharge adhering to the inner surface of the ear.

Cause and Lesions.

Examination of several pigs showing such symptoms has revealed the presence of a suppurative condition affecting the middle ear, and this may be the only demonstrable pathological change found on post-mortem examination.

The hearing apparatus, it may be mentioned, consists essentially of three parts:—

(1) The external ear, which is that portion visible externally. Its function is to collect sound waves and transmit them by means of a passage to—

(2) The middle ear: This is separated from the external ear by the tympanic membrane or "ear-drum." The function of the middle ear is to magnify the sound waves collected by the external ear and transmit them to—

(3) The internal ear: This consists of an intricate structure by which the sound impressions are transmitted to the sensory areas of the brain. The internal ear, however, performs another very important function—namely, the maintenance of equilibrium, it being by means of part of this structure that an animal keeps its balance. Disease of these deeper structures of the ear, therefore, frequently leads to an unsteady gait, twisting of the head to one side, or even to inability to stand at all.

Both the middle and internal ears are situated within the petrous-temporal bone of the skull and it is within this bone that the lesions responsible for the condition are found. The petrous-temporal bones are placed immediately behind the articulations of the lower jaws and the skull, but a careful dissection by sawing open the skull along the longitudinal mid-line and removal of the brain is necessary to expose them properly.

In several cases so examined, it has been found that a thick, cheesy material is present in the cavities of the bulbous portion (*bulla ossea*) of the middle ear on that side to which the head has been depressed during life. Normally, these cavities in the bone have a honeycombed appearance, consisting as they do of small, empty spaces separated by thin plates of bone.

The accumulated pus in the middle ear tends to burst through the ear drum and discharge externally, giving rise to the sticky discharge which may, in advanced cases, be seen on examination of the passage in the external ear.

Examination of the pus shows the presence of bacteria, such as are commonly met with in other suppurative conditions in the pig. It is probable that in these cases they gain entrance to the deeper structures of the ear by way of a narrower passage (called the Eustachian tube) which leads from the back of the throat to the middle ear, and from the comparative frequence of nasal catarrh in young pigs, it is probable that this ear disease is an extension of this inflammatory process affecting the lining membrane of the nasal passages.

Prevention and Treatment.

Once the condition is established, it is unlikely that any treatment will be of use. Syringing of the outer ear will remove the obvious discharge, but will not penetrate into the deeper structures from which the pus arises. While the discharge cannot be definitely prevented, all possible means, such as proper attention to cleanliness and housing, should be undertaken in order that chills may be avoided. Diet should also be attended to, as it is found that this also plays a not unimportant part in the causation of those diseases, such as catarrh (snuffles) and pneumonia with which the condition is frequently associated.

More Efficient Feeding Necessary.

As will be noted from the remarks of the authorities referred to above, both in regard to the condition, paralysis of the hindquarters, and to that more recently described by Doctors Seddon and Carne, it is apparent that any form of treatment must be preceded by a general clean up of all the piggery buildings, yards, paddocks, &c., careful attention to breeding, and to the selection of reliable, healthy strains of pigs with which to stock up farm piggeries, to a more efficient system of

feeding pigs, and to the use of mineral matters in the food given to pigs of all ages. It will be noted that special emphasis has been given throughout to the consistent use of liberal supplies of green food, lucerne, rape and barley, corn, pumpkins and melons, sweet potatoes and other root crops, grasses, and to any other green foods available on the farm.

Mineral Mixtures.

The preparation and use of mineral mixtures is especially worth attention, for they will be found of great value in all seasons whether the supply of green food is available or not. In this connection the following recipes are suggested as being suited for use on all pig farms; the ingredients are reasonable in price, and are not difficult to obtain, and it should not be difficult for any farmer to arrange for a supply of these very necessary additions to the pigs' diet.

Mix together—Charcoal, 20 lb.; hardwood ashes, 20 lb.; coarse salt, 8 lb.; air-slaked lime, 4 lb.; flour of sulphur, 4 lb.; powdered copperas (sulphate of iron), 2 lb.

Prepare as follows:—First mix the lime, salt, and sulphur thoroughly, then add the charcoal and ashes. Dissolve the copperas in two pints of hot water and sprinkle over the whole mass, mixing it thoroughly.

Keep some of this mixture before the pigs at all times in a strong box securely fastened in a weather-proof corner of the sty. Provide ample clean cold water at all times.

Lime water should be added to the morning feed, using half a pint to each two gallons of food. It will also pay to add a few ounces of sterilised bone meal to the food of the growing pig. This meal can be ordered specially for this purpose from any of the leading dealers in artificial fertilisers or from firms like Messrs. Thos. Borthwick and Sons (Australasia) Ltd., Wharf street, Brisbane, who also supply meat meal—a protein supplement of much value. It may seem that these condiments are expensive and unnecessary, but in actual practice they will give a handsome return on the outlay, though it might be difficult to demonstrate this in actual pounds, shillings, and pence.

The provision of these mineral mixtures will satisfy the pig's desire for mineral substances and will prove of added value as a tonic and appetiser. Salt licks also are now available on the market, and are becoming increasingly popular each year.

Minerals are just as important in the growth and development of the pigs as are proteins, carbohydrates, fats, vitamines, ash, water, and other nutrients and more attention should be given to their provision, because, as a rule, insufficient quantities are present in the ration.

All pig rations, of course, contain some minerals, but there are practically no pig rations, unless specially prepared, that contain an adequate quantity to meet the requirements of the pig's body. Pigs need minerals for the building up of bone, for making muscle, for cell division, and for the carrying on of innumerable physiological functions.

Without minerals, growth and development will be restricted, and the pigs will be less profitable. Many pigs suffer because they receive inadequate quantities of minerals, but no pigs suffer because too large quantities are given to them. Consequently, we should see that our growing pigs have access at all times to a good mineral ration balancer.

Corn Cob Charcoal.

A good use for the corn cobs (cores) that have always been allowed to accumulate on most farms and around piggeries is to make charcoal of them. The cores in themselves do not make a good feed for pigs because of their high and coarse fibre content, and even if the whole cob (corn and core as well) is ground, it has yet to be proved that there is an added value in them. The core is practically indigestible fibre that only burdens the pig's digestive organisation and causes indigestion.

After the pigs have taken all the corn from the cob, however, the waste cores can be raked together into a pile and burned to the point when it is all a live mass of coals. Water should then be sprinkled over the pile to put the fire out, and the partially charred cores gathered up for the pigs. If there are any other "chips" available, or any old corn husks, these should also be gathered and burned, and added to the charcoal made from the cores.

Some of the farmers in the "Rivers" district of New South Wales have for years followed this practice, and in these days when suction gas plants are in use to such an extent, quite a large trade has sprung up for the charcoal burners. In this case large pits are dug in the ground and suitable lengths of logs are pulled

into these; they are then fired, and after a time are covered with earth. In a few days' time a good class of charcoal results. These farmers have been making good money, and, at the same time, clearing their holdings.

Provide more Water.

The water supply should have special attention, for certain it is that many pigs do not have a sufficient supply of clean drinking water, and, as a general rule, pigs from a few days old upwards will be found to appreciate liberal supplies; it is surprising how much water a pig a month old will drink if he has the opportunity of securing a supply.

Careful Handling in Transit.

Many pigs are handled so roughly in transit to market that they arrive at the markets, factories, &c., down in the back or otherwise disabled.

The writer has seen hundreds of cases like this in which the animals have been unable to walk from the railway trucks. The industry suffers heavy losses each year as a result. It should be the duty of every farmer to see that not only his own, but that all other animals in transit to market are handled carefully, and that no undue haste is made in rushing the animals into trucks or other means of conveyance.

The Condition of the Breeding Sow.

Reference has been made above to the fact that frequently breeding sows suffer from paralysis of the hindquarters as a result of loss of vitality and condition from suckling a large litter of thrifty, vigorous pigs. In this regard it is necessary that the breeder should know the correct condition in which to maintain his breeding sows.

Figures shown represent sows that are too low in condition to farrow and rear their litters successfully, these sows would, in all probability, suffer severely as a result, and their progeny could not be regarded as having the same chance as the progeny of the sows illustrated which represents the normal condition of breeding sows, the condition in which a sow should be maintained for best results; sows that are too fat are likely to have trouble at farrowing time, and their progeny will frequently prove to be weak, puny, and unable to battle for themselves.

The importance of diet and the necessity for careful attention to all details of management are strikingly illustrated in the plate from Henry and Morrison's latest book on "Feeds and Feeding."

Overfeeding Young Pigs on Corn—A Cause of Paralysis of the Hindquarters.

The importance of properly balanced rations cannot be too strongly stressed. Many bacon pigs suffer from paralysis of the hindquarters as a result of being overfed on a ration consisting almost exclusively of corn and water or even of corn and milk; in fact, many authorities condemn the use of corn as a food for young pigs, but the writer's experience demonstrates that, provided corn is fed in comparatively small quantities during the early stages and is well balanced up with liberal supplies of milk, green stuff, &c., that it can be fed to very considerable advantage to all classes of pigs. In these days there is no demand for heavy fat bacon, hence there is no profit in over-feeding pigs on expensive grains, though some grain is necessary, especially in the case of young growing pigs.

Departmental Suggestions.

In the Departmental pamphlet, "Pig Raising in Queensland," brief reference is made to the disease Paralysis, and the following excerpts will prove of interest:—

Paralysis in pigs is brought about by several causes, viz., rheumatism, worms in the kidneys and surrounding parts, or by over-feeding young pigs on an exclusive diet of corn and water.

Treatment.

If due to rheumatism, see that the pigs are housed at night in a dry place, and allowed to sleep on wood flooring instead of on concrete or earth. Give daily salicylate of soda 15 to 30 grains, and bicarbonate of potash 1 to 2 drachms, in the food or as a drench.

If due to worms give, in the food or as a drench, 1 teaspoonful of oil of turpentine, 20 drops of perchloride of iron, and 3 or 4 oz. of raw linseed oil. This is sufficient for 50 lb. body weight.

It should be given after the animal has been fasting for some hours, and can be repeated several times, with an interval of three or four days. When due to feeding, as mentioned above, stop the corn and give once daily in a mixed diet or in milk 1 dessertspoonful of the following powder for every 100 lb. body weight (after it has been well mixed and powdered):—Sulphur 2 oz., sodium bicarbonate 4 oz., sodium sulphate 2 oz., black antimony 2 oz., sulphate of iron 1 oz., wood charcoal 2 oz.

A useful mineral mixture well worth trial also is made up as follows:—Add 1 dessertspoonful of the following mixture to the food of each pig daily:—Sulphate of iron, 1 part; sulphur, 2 parts; sterilised bone meal, 10 parts. Very young pigs should receive about half these doses. The following excerpt is also of interest in studying this peculiar disease, Paralysis of the Hindquarters.

Causes.

When asked why pigs go down behind and suffer from a form of paralysis, Dr. K. W. Stouder, an Extension Service Specialist at the Iowa State College, U.S.A., said—

Weakness of the legs and back to such an extent that the animal is unable to stand is commonly seen among pigs. It is seen more often in recent years, perhaps, than it was some years ago.

We must not assume that it is all caused by the same thing, nor that all cases are exactly alike. In fact, they can easily be divided into at least two groups, the old sow that goes down and the growing store pig. Most sows go down after suckling a vigorous litter of pigs, and such cases are usually due to a lack of enough minerals, proteins, and vitamines in the rations to support the litter she raises and to provide for her own body-maintenance needs as well.

Many of these cases recover as the experienced feeder knows, if the patient is put on a ration of whole cow's milk every day, as it supplies the deficiencies, but it is more important to remember that this type of going down behind would not have occurred had the food ration been well balanced during the gestation period and while she was suckling her litter.

Young pigs may also go down because of the unbalanced rations, particularly it seems if the ration is low in mineral content and of the vitamins so essential to good health. It may also result from generations of breeding and selection, together with forced feeding for early maturity, rapid gains and excessive fat production, disregarding constitution, good bony frame work and vigour. Cases of this kind are common, we believe, and they strangly indicate why these animals and their close relatives should be discarded as breeding animals to perpetuate the herd, for in such cases predisposition has much to do with its occurrence. Its occurrence one generation after another in certain families can thus be accounted for in part at least.

Some animals that go down show deficiency of bone; some show degeneration of nerves that control the muscles of the back and legs; others are found to suffer disease of the bony surfaces that come together at a joint; particularly where the thigh bone attaches to the body. These lastnamed cases of diseased joints may be the result of navel infection during the first few days after birth and could have been avoided had the pig been farrowed in a very clean place and kept under the cleanest surroundings, together with iodine or other antiseptic treatment of the navel until it dried up.

Difficulty of Diagnosis.

The treatment of these cases gives variable results, perhaps depending first upon the difficulty of diagnosing with certainty the exact trouble in each case presented for treatment. Some cases improve on a mineral mixture, especially if given calcium phosphate, and others do better on spoonful doses each day of cod liver oil because the latter is rich in vitamines.

It is suggested that breeding animals and growing animals be given well balanced rations, so far as providing plenty of protein is concerned in relation to the fattening foods; that minerals be kept available and a mixture of equal parts of air-slacked lime, salt, and bone meal by weight serves as good as any.

Preventive Measures.

When young pigs are born, apply tincture of iodine to the navel daily until it is dry. Don't keep even the relatives of the pigs that show this trouble for breeding purposes. When it occurs, give whole milk, cod liver oil, calcium phosphate, and carrots, if you have them available, in addition to a well-balanced ration and some cases will recover, but there are those that never get up though appetite and general health otherwise seem good.

There are cases, of course, in which the ailment is due to accident. The treatment for these cases must be on common-sense lines, and must aim at keeping the animal in good heart and in otherwise healthy condition. There are other cases in which intestinal worms, and possibly kidney worms, are the direct or the indirect causes; these cases must receive a course of treatment that will tend to clear them of the parasites and put them in a condition to battle against future infestation.

Another American authority has this to say on the subject:—

"Professor L. A. Weaver, swine specialist of the Missouri (U.S.A.) Agricultural College, states that the two minerals most frequently lacking in the food for pigs are calcium and phosphorous. Experiments have shows that pigs are able to use these minerals when supplied either in an organic or inorganic form. In other words, ground limestone, which is calcium or lime phosphate, serves as well as a source of phosphorous as does wheat bran, where the phosphorous is in an organic form. Calcium may be satisfactorily furnished in almost any form, such as lime, ground limestone, or bone meal."

Included among suggested remedies by other authorities as well as by our own experience in handling animals in a paralysed condition are as follows:—

Where animals have the benefit of a grazing area, it would be an advantage, if possible, to subdivide this, allowing them to use only one portion at a time, the other portion resting and sweetening up meantime. Where the ground is at all swampy or low lying, some endeavour should be made to drain the area. It is on these low lying, swampy areas where infection from kidney worms or from intestinal worms would be suggested, hence the advisability of changing the pigs from one pasture to another frequently. Pigs infested with kidney worms, however, seldom recover normal condition, though they may appear perfectly healthy and have good appetites. There is, unfortunately, no external indication of the infestation unless paralysis be accepted as a definite symptom.

Results of Experiments.

A series of experiments carried out at one of the Agricultural Colleges in England demonstrated that pigs fed on an exclusive corn diet have a weaker bone than those having a better balanced ration. If, therefore, animals are receiving corn alone, other foods, especially skimmed milk and green foods (with minerals), should be added to make up the deficiency.

Within the last year or two, a very extensive investigation overseas regarding this disease, has demonstrated among other things that pigs affected with paralysis of the limbs have a broken down condition of the nerves that supply the muscles of the hind limbs with innervation. While it is possible that this is not always the case, still it was found in a large percentage of the patients examined, and as degenerated or broken down nerves cannot be restored to their full function, we are forced to come to the conclusion that paralysis of the hind parts of the pig is, in many cases, incurable. The cause of this breaking down of the nerves is not known, and, therefore, intelligent curative treatment cannot be recommended. Preventive treatment is always somewhat vague, but it is always well to separate the diseased from the healthy pigs, to disinfect all pens by spraying them or by the application by hand of limewash, and by avoiding the use of affected pigs or pigs closely related to them for breeding purposes, as there is some danger that there may be a hereditary predisposition to the disease.

In cases due to accident or injuries, common-sense methods must, of course, be employed in treatment. Meanwhile, the animal requires careful housing and a course of medicinal treatment to keep the bowels and bladder free. The food should be of a soft, nourishing nature. Allow water and green food also.

The use of cod liver oil appears to have the general recommendation of a number of investigators handling paralysed pigs. This oil given at the rate of one teaspoonful per pig (from 6 months old upwards) daily, mixed in the food is suggested.

Another remedy recently suggested in dealing with the disease as one due to a deficiency of mineral matters and to a lack of vitamines indicates that something

needed for nutrition is absent in the foods in use for the affected pigs. The Colorado Agricultural College authorities in answering an inquiry on these lines recently give this advice, "That as the foods being fed to the animals under review had on analyses shown a deficiency of minerals, and were particularly deficient in vitamine B., it was recommended to try feeding the pigs on a ration consisting of plenty of milk and carrots, using new milk for a start and skimmed milk later. Results under experimental work with this ration in case of pig paralysis have been remarkable.

An Incurable Form.

Paralysis resulting from tuberculous bones is incurable, and as the carcases would not be fit for human consumption the sooner they are destroyed the better. It is, of course, possible to test pigs with the tuberculin test, though this is not a very satisfactory business with pigs for the reason that it must be carried out by a competent veterinarian and the expense incurred would hardly be justified except in the case of very valuable stud pigs.

If there is any conclusive evidence that the animal is tubercular, he had better be destroyed immediately and be burned to ashes on the spot on which he is killed.

In addition to paralysis resulting from tuberculous bones, any abnormal condition affecting the spinal cord, such as abscesses, tumours, parasites, or even diseased and softened bones may be a primary cause for the trouble. Paralysis immediately following farrowing is, in our experience, not common, but it may result from a weakened condition of the animal and in cases of this description the preventive measures indicated should be adopted, as also in cases attributed to lumbago and rheumatism.

Early Signs of the Trouble.

As a rule, paralysis comes on gradually, being indicated in the first instance by a wobbly, uncertain gait, the animal failing to control its movements, particularly if hurried or if the animal is turning around. Walking gradually becomes more

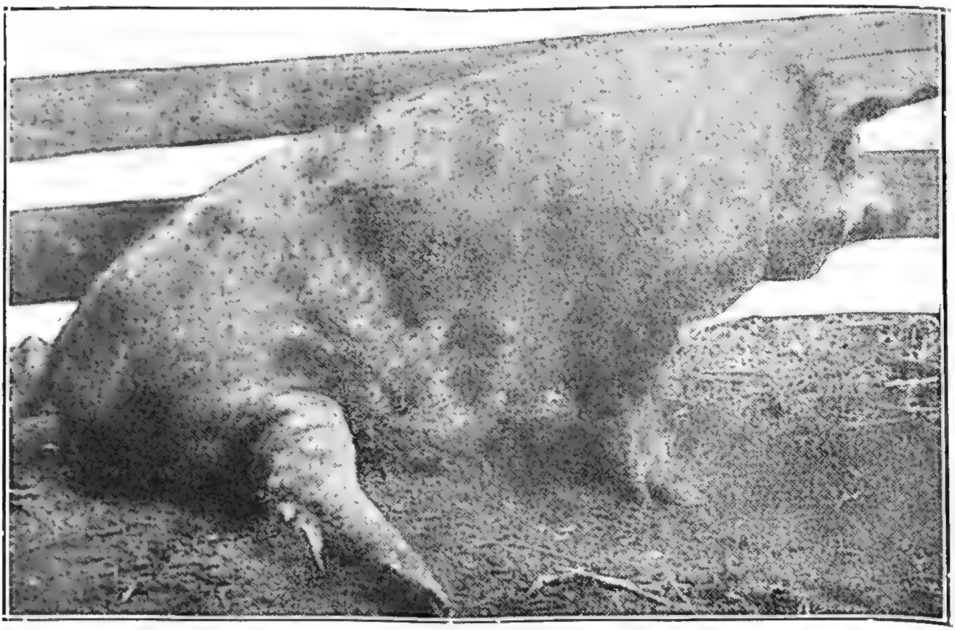


Plate 101 (Fig. 1).

A typical case of Paralysis of the Hindquarters. It will be noted that although paralysed in the hindquarters to the extent that she cannot raise her hind legs or use them in any other way, the animal has not lost condition. Strangely enough, the appetite is not usually affected provided the animal is otherwise normal.

difficult as the weakening of the nerves and muscles of the hindquarters progresses, but in almost every instance the appetite and general health of the animal is not affected, hence any abnormal change in the appetite or any other indication of sickness must be looked to as premonitory of other and perhaps more serious troubles. Constipation must be relieved by repeated doses of Epsom salts or castor or linseed oils. Massaging of the affected muscles and the application of liniments as referred to above are suggested.

Finally, it is suggested that in every instance where the trouble appears in more than one animal, or where it appears that ordinary care and attention is ineffective in bringing about the desired result, the services of a qualified veterinary surgeon should be requisitioned to take complete charge of the case.

Plate 102 (Fig. 2).

These pigs are suffering from a very severe attack of paralysis of the hindquarters. The pig on the right is still able to move about but with great difficulty and a very uncertain gait, but as is the case with the other two is quite unable to

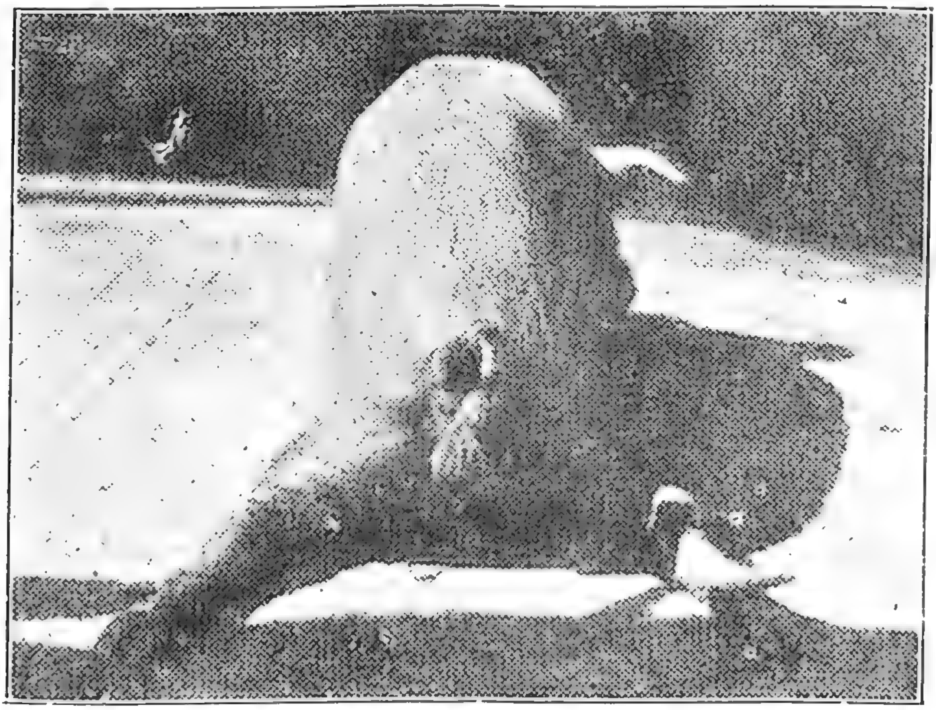


Plate 103 (Fig. 3).

Symptoms of posterior paralysis (breaking down in the back).

control its movements. The photograph is of pigs fed on a ration containing a very low mineral content. Stiffness and partial loss of control followed after about six weeks feeding. In the same experiment a second lot fed the same ration plus five times as much calcium phosphate as lot No. 1 had gained 89 per cent. more weight and were not affected with paralysis. Both lots were afterwards slaughtered. The skeletons of the pigs illustrated in Fig. 2 weighed 1,193 grams. That of the pigs fed in separate pen and which were given sufficient calcium phosphate weighed 2,371 grams or 100 per cent. more.

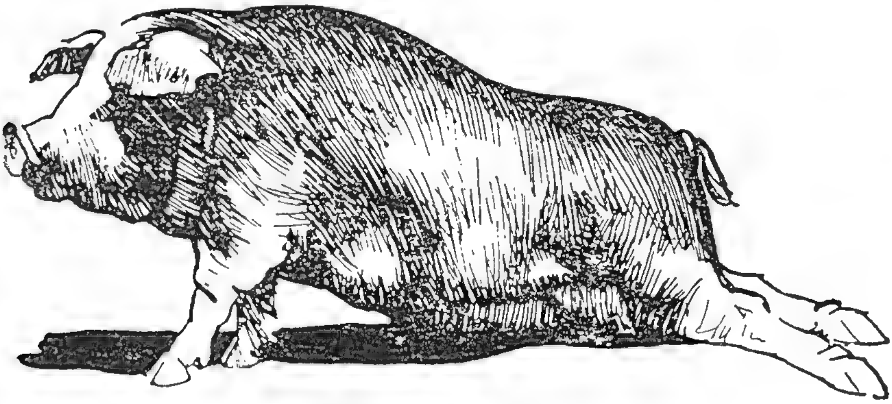


PLATE 104 (Fig. 4).

Illustrating a pig that has been injured in transit and unable to travel. Many pigs arrive at our bacon factories and saleyards in such a condition, resulting in their market value being reduced probably 75 per cent. This emphasises the necessity of giving careful attention to the animals in every stage, particularly in transit.

PLATE 105 (Fig. 5).—PIGS SUFFERING FROM SEVERE CASES OF RICKETS.

These pigs received a ration of white corn and skim milk, without pasture. Note the paralyzed condition. The pig on the left died within a week after the photograph was taken, while the one on the right gradually recovered when cod-liver oil was added to the ration.

(From Henry and Morrison's "Feeds and Feeding.")

These pigs are suffering from an advanced form of the disease Rickets, a similar condition to that referred to as Paralysis of the Hindquarters. The reference to this illustration emphasises the necessity of careful feeding and the provision of a liberal supply of mineral matters and vitamines in the food.

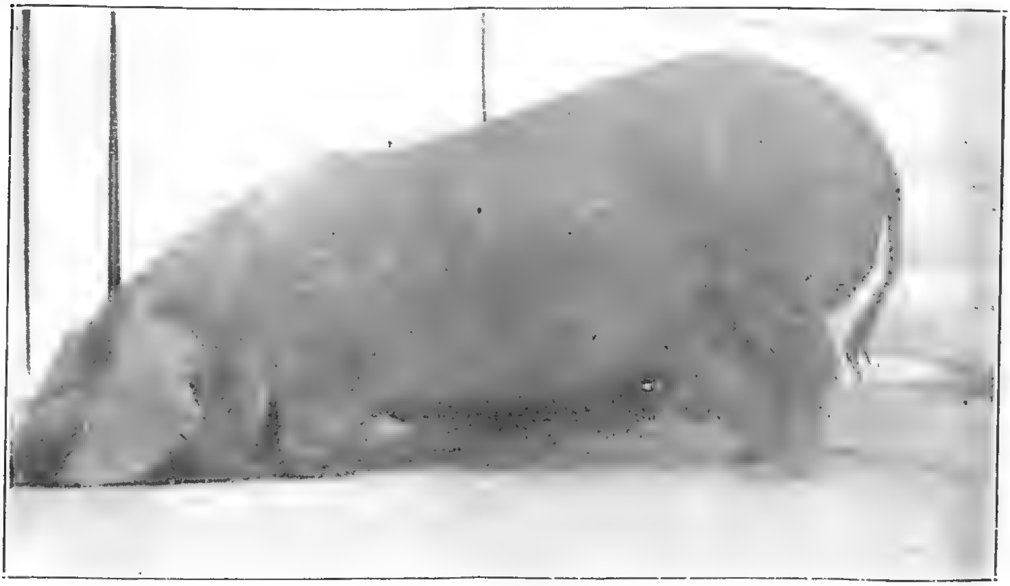


Plate 106 (Fig. 6).

Fig. 6 is of a Large Black Sow suffering from paralysis of the forequarters, the result of rheumatism. This sow was unable to walk for several weeks during treatment, but she eventually recovered but was not used for breeding purposes again. Her trouble was evidently a constitutional one, as she did not suffer from injuries and was carefully fed and housed at all times.

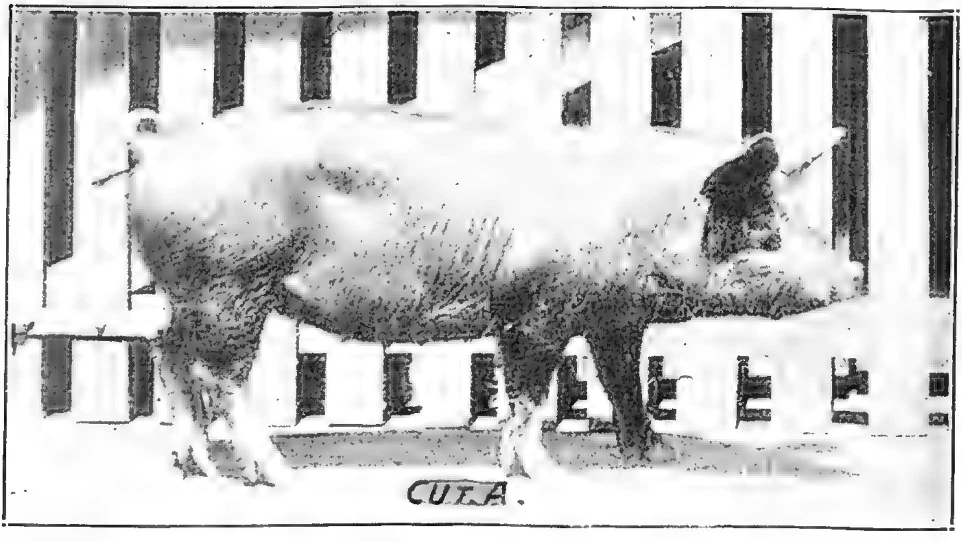


Plate 107 (Fig. 7).

Figs. 7 and 8 are of farm sows of uncertain breeding too low in condition to prove satisfactory. The young sow in Fig. 7 is too low in condition to mate to the best advantage, while the sows shown in Fig. 8 are too low in condition to rear their young satisfactorily. Sows in such a condition frequently suffer for many months after farrowing, and even if they do not develop paralysis their progeny are more liable to disease and to abnormal troubles than the progeny of sows in medium breeding condition. Sows of the types illustrated should not be retained as breeders as their breeding is doubtful and there are plenty of better type sows available at prices comparatively low.

Plate 108 (Fig. 8).

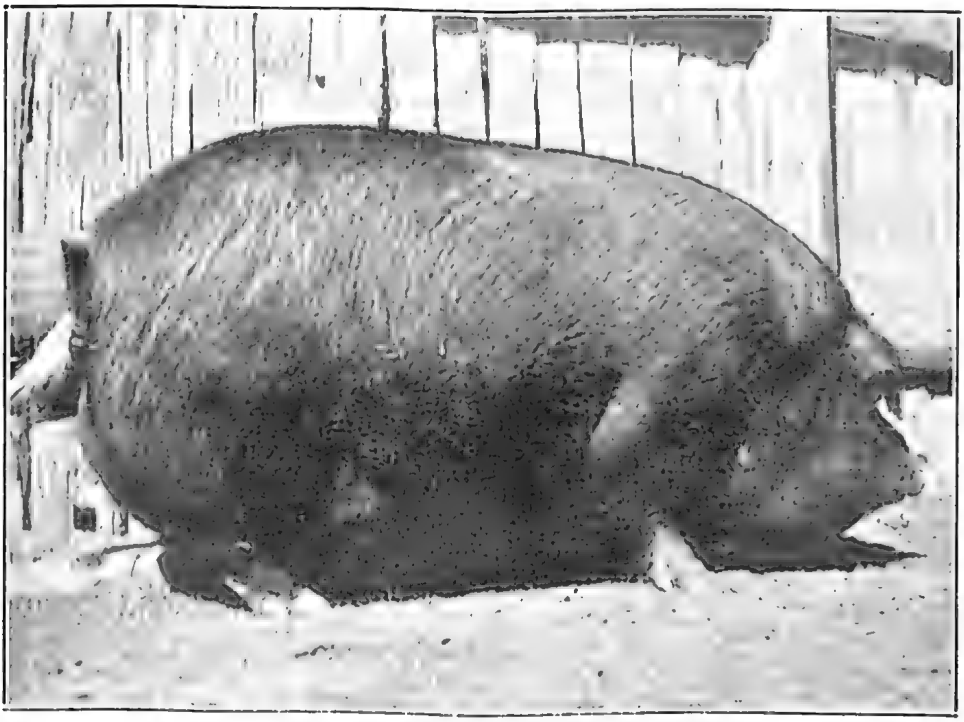


Plate 109 (Fig 9).

Fig. 9 is of a Poland-China sow too fat to prove satisfactory as a breeder. She is carrying far too much condition and would be liable to suffer from troubles such as heat apoplexy as well as paralysis. This photograph was taken a few days after this sow arrived from America some years ago. Her condition was in part due to the generosity of the passengers on the same steamer who were anxious that the pigs should arrive in the very best of condition. The sow proved a failure as a breeder largely as a result of this overfattening.

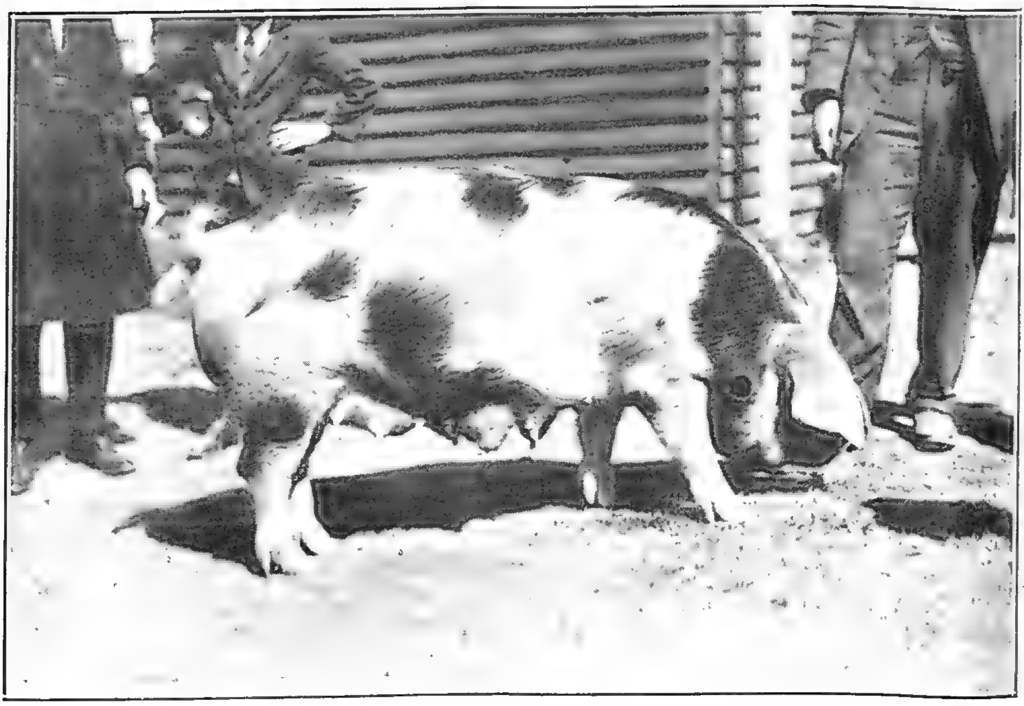


Plate 110 (Fig. 10).

Plate 111 (Fig. 11).—A Group of Selected Berkshire Brood Sows.

Sows of this description always realise good values in normal seasons, and are worth special care.

Fig. 10 is a prize winning Gloucester Old Spot sow at the Brisbane Show, 1925. This sow was rearing a large litter of active, vigorous pigs approaching weaning age. She is in ideal condition for a sow at this stage, for it is not to be expected that a sow will hold her condition whilst suckling. This emphasises the necessity of having the sow in proper condition prior to farrowing time in order that she may be able to do justice to her pigs.

Fig. 11.—Berkshire Sows in medium breeding condition, the condition conducive to satisfactory results. This is the ideal condition for in-pig sows, for they will farrow with little or no trouble and be able to rear their litters satisfactorily and without risk of going down in the hindquarters or suffering from other diseases.

COTTON VALUES.

The Minister for Agriculture (Hon. W. Forgan Smith) in the course of a recent Press statement on the proposed guaranteed prices for cotton for the 1925-26 season, mentioned that the Commonwealth Government made the proposal to the several State Governments concerned that payment should be made on length of staple as well as on grade. Following are the staple lengths proposed:—

Staple I.—One inch (1 in.) in length downwards.

Staple II.—Full inch (1 in.) to inch and one-eighth ($1\frac{1}{8}$ in.).

Staple III.—Good inch and one-eighth ($1\frac{1}{8}$ in.) upwards.

The grades are:—

Grade.	Corresponding Universal Lint Standards.	Staple I.	Staple II.	Staple III.
A ..	Middling fair Strict good middling Good middling	$3\frac{1}{2}$d.	$4\frac{1}{2}$d.	5d.
B ..	Good middling Strict middling Middling	3d.	4d.	$4\frac{3}{4}$d.
C ..	Middling Strict low middling Low middling	$2\frac{3}{4}$d.	$3\frac{3}{4}$d.	$4\frac{1}{4}$d.
D ..	Low middling Strict good ordinary Good ordinary	$2\frac{1}{2}$d.	$3\frac{1}{2}$d.	4d.
	Immature Cotton—			
X ..	Equivalent to good middling spot ..	3d.	4d.	$4\frac{3}{4}$d.
XX ..	Equivalent to middling spot ..	$2\frac{3}{4}$d.	$3\frac{3}{4}$d.	$4\frac{1}{4}$d.
XXX ..	Equivalent to good ordinary ..	$2\frac{1}{2}$d.	$3\frac{1}{2}$d.	4d.

To these proposals the Queensland Government has advised the Commonwealth of its acquiescence.

Further mention was made by the Commonwealth of the growers' request for a bounty, and as has been previously announced through the Press, the Queensland State Government was prepared to support the appeal. In addition, it was pointed out that the Minister had already expressed his willingness, in the event of the bounty being given by the Federal Government, to relinquish the control of the cotton industry generally, and only to exercise control to the same degree as applies to agricultural industries generally.

SEGREGATED COTTON GROWING.

The subjoined extract from the "New York Journal of Commerce" of recent date shows how seriously the United States Department of Agriculture considers the necessity of growing "community basis" cotton, and emphasises the advantage that Queensland has gained by starting off on such a basis. Differences in conditions governing the cotton industry in the United States and Australia must, however, be borne in mind when considering any relationship of the American plan to our own particular cotton interests. There, of course, the industry is firmly established in several States, and the cotton belt covers enormous territory with immense crop acreages.

"Washington, 2nd August.

"A programme of activity with the States looking to the adoption of a single variety of cotton in each of the cotton-growing communities of the South is being mapped out by the Bureau of Agricultural Economics of the Department of Agriculture. This calls for a study at the outset, in co-operation with the various State institutions and extension services, of production in the States and to this end it is planned that six communities in each State undertake the assembling of 1,000 samples of cotton representative of the crop that passed through each such market during the season.

"Each of the samples will be marked as to variety, date of sale, price, and buyer's description. In each State the samples will be assembled at a central point and classed by representatives of the New Orleans Board of Cotton Examiners. Department of Agriculture officials declare that from these samples and data accompanying them it will be possible to obtain a great deal of information which may later be used in a campaign to extend production of cotton on a community basis, and to show the advisability of each community adopting a single superior variety of cotton and delaying the planting thereof until the season is sufficiently advanced to insure proper growth of the crop, rather than individuals planting early, thereby incubating boll weevils which infest the crops of others.

"It is contemplated that this study will lead to the encouragement of co-operative marketing, it being considered possible that the data will show the advisability of selling cotton through the co-operatives in order to obtain the premium which is paid for the better quality of cotton. The comparison of the price basis in the several communities should show in concrete terms the advantages of the one-variety community practice. The price paid for specific varieties when used in conjunction with data on their productivity, general outturn, and such other information as can be supplied by the experiment stations, would be useful in the establishment of these varieties in the different communities. The information on handling methods, such as excessive sampling, tare, irregularity, &c., would be useful in evolving concrete problems for subsequent studies. The data, together with the observations of those conducting the study, would be useful in arriving at the most advantageous form of community organisation for production, gin ownership, and marketing.

"'It would be the purpose of this study to find out the facts as they exist as a basis for improvement in conditions,' declared H. T. Crosby, of the Division of Cotton Marketing, Bureau of Agricultural Economics. 'The plan of operation is to secure actual samples from typical bales, taking in each case a memorandum of the date, variety, buyer's grade, place of sale, and the price paid to the producer for the bale. The hope of the department would be that the results would tend toward single-variety production in the communities.'"

LEAF SPOT ON BANANAS.

In order to prevent any misconception or any undue anxiety regarding the presence of the leaf spot on banana plants that made its appearance in many parts of coastal Queensland towards the end of last summer and continued to extend during autumn, the following information regarding the outbreak is offered for the benefit of banana growers:—

The leaf spot is caused by a microscopic fungus closely related to the shot-hole fungus of stone fruits, the spores of which are carried by wind and, under favourable conditions of heat and moisture, germinate when they come into contact with a banana leaf. The spots characteristic of the trouble then make their appearance. They increase in size, the leaf-tissue is ruptured, and finally the whole leaf is affected and dies. The oldest leaves are the first to be attacked and in severe cases every leaf is destroyed, and nothing but the bare pseudo stem of the plant is left with the bunch entirely unprotected. Where the fruit is well developed there is little

loss as it can be marketed, but when the bunch is immature the fruit will not develop and is valueless. Sometimes the bunch falls right out.

Where the pseudo stem has not produced all its leaves the damage is not usually so acute, as the plant may recover and throw a bunch which will not, however, carry fruit of the best quality, but smaller fruit of marketable size. The trouble is of a purely seasonal nature and may not reappear for some time, for at present it is dormant and may continue to be so until conditions are more favourable for its development. Plants that were badly affected are now producing new leaves that show no sign of the trouble. At the same time growers are strongly advised to keep a very careful watch for any reappearance and to take precautions for preventing it again becoming a menace to the banana industry.

The precautions to be taken are of a preventive not a curative nature, and are similar to those in use in the case of diseases, such as Irish Blight of potatoes or Downy Mildew of the grape, with the exception that the fungicide used is to be applied in the form of a dust instead of a spray, as the latter is not practical in most of our banana plantations.

The application of a copper lime dust by means of a dust gun is recommended, the work to be carried out in the early morning or evening when there is no wind and preferably when the leaves are moist with dew. The dust should be applied as soon as the first traces of spot are seen, and should be repeated when necessary so that the young leaves may be protected when they make their appearance. Copper lime dust and dust guns will shortly be obtainable in Brisbane.—A. H. Benson, Director of Fruit Culture.

MILK AS FOOD FOR FARM ANIMALS.

Since milk is nature's food for animals, it has been assumed that milk contains all the elements combined in the right proportions necessary for the perfect growth of the young. Experiments have shown, writes E. T. Halnan (Animal Nutrition Institute, Cambridge University), that this assumption needs modification, particularly when milk designed for one particular species of animal is utilised as food for another species.

It has been demonstrated, for instance, that the milk of cows fed under winter-stall conditions is often deficient in those vitamines considered essential to growth. Moreover, calves fed on milk to the exclusion of other foods will eventually die. Milk is also deficient in one important element—*i.e.*, iron. The reason why the young animal grows successfully during the suckling period is that at birth a sufficient store of material rich in iron is present in the liver to supply its requirements during the suckling period. The deleterious effect of the absence of iron in the milk is consequently only shown when this reserve store is exhausted.

Analyses of milks of different species show very wide variation among the species, owing to the fact that the composition of the milk of each species is especially adapted for the efficient growth of that species during the normal suckling period. There is considerable variation in percentage compositon, both with regard to protein and fat. The sugar and ash also show considerable variation. A very interesting point also reveals itself when the figures are compared with the time taken for each species to double its weight, low ash and protein percentages being associated with the slowest growth rate, and *vice versâ*. Moreover, when the ash is analysed it is found that the relative proportions of ash constituents present agree fairly closely with the relative proportions present in the carcass of the young animal, with the exception of iron, as noted above. Since these relative proportions vary with each species, it is not easy to substitute the milk of one species with another; since even though the milk be treated so that the relative percentages of protein, fat, sugar, and ash are obtained, the balance of ash constituents will be different.

But though milk is not, after all, the perfect food that one had thought, and though milk of one species may be quite unsuited to another species, it is, nevertheless, desirable as a food. Milk is a food which is highly assimilable by stock, is easily handled, is very digestible, and contains proteins of high quality—*i.e.*, proteins which contain all the elements for tissue building. In the case of very young stock, therefore, its use is always justified even though its use may prove expensive, since the animal will be given a good start in life at the critical period of its career. A check in the early period of life is difficult and expensive to correct at a later stage, so that money saved by economical feeding at an early stage may be lost later in the endeavour to correct the stunted growth. On the other hand, the feeding of adult stock on milk is wasteful, although it is an advantage to feed by-products of milk, butter, and cheese if a cheap source of supply is available.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF AUGUST, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING AUGUST, 1925 AND 1924, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Aug.	No. of Years' Records.	Aug., 1925.	Aug., 1924.
North Coast.	In.		In.	In.
Atherton	0·83	24	1·73	0·93
Cairns	1·80	43	1·92	3·16
Cardwell	1·32	52	0·85	1·94
Cooktown	1·35	49	1·73	1·40
Herberton	0·68	38	0·75	1·09
Ingham	1·55	33	1·94	5·60
Innisfail	5·24	44	4·87	5·32
Mossman	1·59	17	0·58	6·57
Townsville	0·53	54	1·75	2·68
Central Coast.				
Ayr	0·65	38	0·85	4·07
Bowen	0·71	54	0·83	0·90
Charters Towers ...	0·61	43	1·06	3.71
Mackay	1·05	54	4·66	0·56
Proserpine	1·45	22	2·93	3·36
St. Lawrence ...	0·90	54	1·55	0·66
South Coast.				
Biggenden	1·14	26	1·48	0·65
Bundaberg	1·36	42	1·02	0·50
Brisbane	2·12	74	3·14	1·35
Childers	1·30	30	1·21	1·48
Crohamhurst ...	2·32	30	5·54	1·86
Esk	1·56	38	3·15	1·91
Gayndah	1·23	54	1·21	1·27
Gympie	1·82	55	1·63	1·29
Caboolture	1·59	38	3·19	1·06
Kilkivan	1·53	46	1·34	0·81
Maryborough ...	1·75	53	1·40	1·62

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Aug.	No. of Years' Records.	Aug., 1925.	Aug., 1924.
South Coast—continued:	In.		In.	In.
Nambour	1·96	29	4·22	1·74
Nanango	1·42	43	2·44	1·00
Rockhampton ...	1·02	38	1·41	0·71
Woodford ...	1·83	38	3·18	1·19
Darling Downs.				
Dalby	1·24	55	3·32	1·77
Emu Vale ...	1·21	29	2·98	1·85
Jimbour	1·26	37	2·93	0·88
Miles	1·18	40	3·66	0·76
Stanthorpe ...	1·82	52	4·01	1·86
Toowoomba ...	1·75	53	3·08	1·39
Warwick	1·55	60	3·79	1·72
Maranoa.				
Roma	1·00	51	2·05	3·80
State Farms, &c.				
Bungeworgorai ...	1·08	11	1·38	3·91
Gatton College ...	1·20	26	...	1·75
Gindie	0·82	26	...	0·70
Hermitage ...	1·39	19	3·26	1·99
Kairi	1·02	10	...	1·13
Sugar Experiment Station, Mackay	0·93	28	3·93	0·46
Warren	0·95	11	1·46	0·44

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for August this year, and for the same period of 1924, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Meteorologist.

RAISINS AS A TONIC.

The raisin-growers of America report having discovered a new use for raisins. They are found to be effective as an afternoon bracer to take away "that sleepy feeling." It is reported that a number of large business corporations are now serving a small package to their entire office force as a mid-afternoon bracer. One of the best-known newspaper offices in Canada has arranged for small packages of raisins to be passed among the employees each afternoon, and every employee, from the printer's devil to the president, takes ten minutes to refresh himself with a handful of appetising and healthful raisins. The practice might well be adopted in Queensland.

EGG-LAYING COMPETITIONS.

MOUNT GRAVATT.

In August 5,771 eggs were laid, being an average of 21·4 eggs per bird, a gain of 2·7 eggs per bird over July. The weather was very changeable. No deaths occurred, and the general health of the birds was good. Individual scores :—

SECTION 1.

White Leghorns.

Name.	A.	B.	C.	D.	E.	F.	Total.
W. and G. W. Hindes	111	105	106	107	109	117	655
W. E. Woodward	111	108	114	88	107	85	613
John J. McLachlan	94	112	106	91	108	73	584
Mrs. R. E. Hodge	99	98	93	117	80	95	582
Eclipse Poultry Farm	115	103	89	98	98	65	568
J. Harrington	80	87	95	108	96	99	565
B. Driver	105	79	75	101	99	106	565
E. J. Stilton	91	95	98	106	107	51	543
M. F. Marsden	85	92	84	77	96	105	539
Jas. Hutton	88	87	107	66	86	96	530
R. C. J. Turner	93	87	93	101	59	91	524
S. L. Grenier	111	102	110	46	71	80	520
H. Fraser	52	97	102	97	91	71	510
Jas. Earl	82	100	60	93	76	93	504
W. Wakefield	100	107	71	89	81	53	501
N. F. Newberry	55	81	106	92	78	76	488
Geo. Marks	58	94	78	72	102	76	480
L. Bird	100	73	68	66	113	54	474
J. E. G. Purnell	90	59	89	101	80	46	465
E. Anderson	37	74	67	77	102	106	463
H. P. Clarke	66	98	63	77	63	95	462
G. W. Cox	65	64	97	92	83	59	460
T. H. Craig	64	92	76	76	67	83	458
Mrs. C. E. Lindley	71	53	73	97	78	78	450
A. S. Walters	86	78	63	78	43	98	446
Mrs. H. P. Clarke	56	95	76	71	96	51	445
Chris. A. Goos	100	46	69	85	53	86	439
T. W. Honeywell	64	1	95	77	85	67	389
W. D. Melrose	94	89	32	2	83	15	315

SECTION 2.

Black Orpingtons (except where stated).

Name.	A.	B.	C.	D.	E.	F.	Total.
Eclipse Poultry Farm	106	92	108	111	102	104	623
H. Cutcliffe	130	85	96	83	110	101	605
E. W. Ward	101	95	101	100	104	91	592
Jas. Potter	119	88	89	87	98	108	589
Geo. E. Rodgers	86	110	108	78	102	79	563
Mrs. A. E. Gallagher	97	92	104	62	86	109	550
W. and G. W. Hindes	125	64	75	60	90	124	533
Carinya Poultry Farm	98	97	48	75	103	83	504
Thos. Hindley	116	67	95	62	95	53	488
J. Pryde (R. I. Reds)	74	81	58	98	79	90	480
R. Burns	89	69	76	88	77	58	457
C. Dennis	82	75	105	83	46	65	456
W. D. Melrose	16	78	98	107	96	58	453
E. Walters	48	56	81	81	98	75	439
Jas. Hutton	79	68	83	63	33	68	394
E. C. Stead	13	49	58	64	47	48	279

N.U.P.B.A. TOOWOOMBA SUB-BRANCH.

Single Test Egg-Laying Competition—Scores to 31st August, 1925.

White Leghorns.

Pen No.	Name.	Aug.	Total.	Pen No.	Name.	Aug.	Total.
52	R. B. Howard	26	114	2	Jas. Taylor	20	67
42	D. H. Dipple	24	113	3	E. Parker	21	65
40	R. C. Cole	22	106	17	W. D. Williams	14	65
41	D. H. Dipple	23	106	45	M. J. Frawley	13	64
8	H. S. Wagner	19	102	13	J. E. King	22	63
39	R. C. Cole	26	102	44	S. B. V. Sharkey	5	63
9	A. C. Horne	20	101	20	H. Dibbs	21	62
50	C. A. Keen	21	99	22	G. E. Rogers	7	60
33	H. J. Manning	23	94	37	P. J. Fallon	19	59
21	G. E. Rogers	25	93	10	A. C. Horne	20	53
29	J. H. Jones	17	91	4	E. Parker	17	49
28	J. W. Short	23	90	25	W. G. Harper	20	49
27	J. W. Short	22	89	6	G. Maurer	19	48
19	H. Dibbs	21	87	5	G. Maurer	25	47
32	J. Newport	18	86	12	Jas. Hutton	15	43
49	S. A. Keen	16	84	55	J. F. Dahlheimer	12	43
11	Jas. Hutton	20	82	43	S. B. V. Sharkey	A7	7
60	M. Murphy	16	82	53	E. W. Howe	*24	101
38	P. J. Fallon	20	81	58	S. Chapman	*22	94
35	R. C. J. Turner	22	80	57	S. Chapman	*24	93
54	E. W. Howe	19	80	23	Everlay P. Farm	*20	89
30	J. H. Jones	21	79	7	H. S. Wagner	*22	85
51	R. B. Howard	22	79	14	J. E. King	*19	85
46	M. J. Frawley	5	75	36	R. C. J. Turner	*22	56
56	J. F. Dahlheimer	21	75	24	Everlay P. Farm	*24	55
1	Jas. Taylor	17	73	15	W. Grant	*23	53
26	W. G. Harper	21	73	16	W. Grant	*16	50
61	J. Goggins	19	72	47	G. Stilton	*14	44
48	G. Stilton	18	69	18	W. D. Williams	*16	34
59	M. Murphy	20	68	34	H. J. Manning	*17	29
62	J. Goggins	15	68	31	J. Newport	*15	15

Other Varieties.

71	H. Dibbs (Lang.)	26	105	80	Everlay P. Farm (W'dotte)	*23	89
75	— Badcock (R.I.R.)	23	84	77	L. Maund (Col. W'dotte)	*18	80
64	S. Chapman (B.L.)	20	83	82	V. Brand (B.L.)	*25	79
65	Mrs. K. O'Connor (B.L.)	20	63	66	Mrs. K. O'Connor (B.L.)	*22	69
69	— Badcock (Lang.)	23	61	63	S. Chapman (B.L.)	*14	65
73	A. W. Le Pla (R.I.R.)	6	61	79	Everlay P. Farm (W. W'dotte)	*8	64
72	H. Dibbs (Lang.)	22	52	78	L. Maund (Col. W'dotte)	*15	55
68	E. Parker (B.L.)	21	47	76	— Badcock (R.I.R.)	*21	53
70	— Badcock (Lang.)	24	45				
74	A. W. Le Pla (R.I.R.)	11	43				
67	E. Parker (B.L.)	17	34				
81	V. Brand (B.L.)	14	33				

Black Orpingtons.

120	Jas. Hutton	28	125	99	A. R. Petty	28	109
117	T. Hindley	29	120	121	E. W. Brock	25	108
89	A. W. Le Pla	25	116	132	G. E. Rogers	27	107
105	L. Maund	26	115	131	G. E. Rogers	29	107
128	J. W. Short	23	113	107	C. Graham	19	100

* Signifies bird laying under-weight eggs.

A Original bird died and has been replaced.

N.U.P.B.A. TOOWOOMBA SUB-BRANCH—*continued.*

Black Orpingtons—*continued.*

Pen No.	Name.	Aug.	Total.	Pen No.	Name.	Aug.	Total.
119	Jas. Hutton ..	20	100	113	D. W. Williams ..	19	66
106	L. Maund	24	99	84	W. R. Wilson ..	19	62
100	A. R. Petty ..	24	94	103	W. S. Adams ..	24	59
97	V. J. Rye	19	94	83	W. R. Wilson ..	27	58
98	V. J. Rye	23	90	115	Everlay P. Farm ..	21	53
96	R. Burns	28	87	92	K. Macfarlane ..	21	53
114	D. W. Williams ..	22	85	122	E. W. Brock ..	13	50
118	T. Hindley ..	27	84	110	S. McBean	25	47
111	E. Walters	17	82	125	H. B. Stephens ..	6	42
126	H. B. Stephens ..	25	81	87	J. Head	12	38
85	— Kelly	23	81	130	R. Neil	*19	119
88	J. Head	24	80	116	Everlay P. Farm ..	*22	107
109	S. McBean	23	78	127	J. W. Short ..	*24	103
102	T. J. Carr	18	77	124	P. Hopkins ..	*14	78
90	A. W. Le Pla ..	20	77	129	R. Neil	*11	59
112	E. Walters	13	74	91	K. Macfarlane ..	*17	59
108	C. Graham	10	73	94	T. C. Ollier ..	*23	56
95	R. Burns	B2	71	104	W. S. Adams ..	*21	47
86	— Kelly	22	67	93	T. C. Ollier	*15	42
123	P. Hopkins ..	12	66	101	T. J. Carr	*11	41

* Signifies bird laying under-weight eggs.

B Died during month.

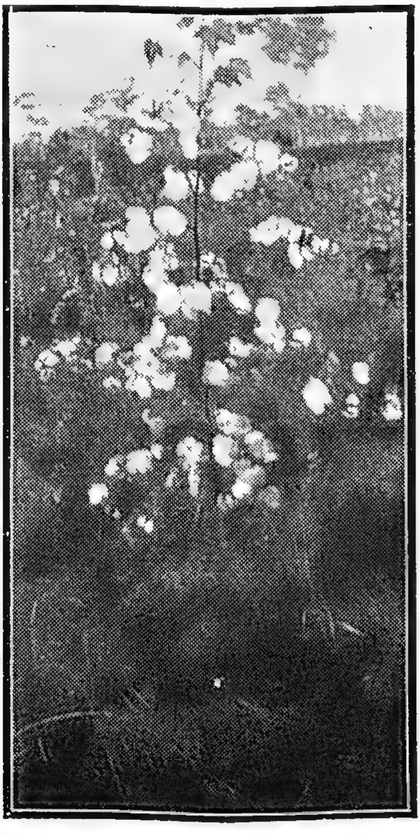


Photo.: N. A. R. Pollock.]

Plate 112.—Cotton in North Queensland—Durango Annual.

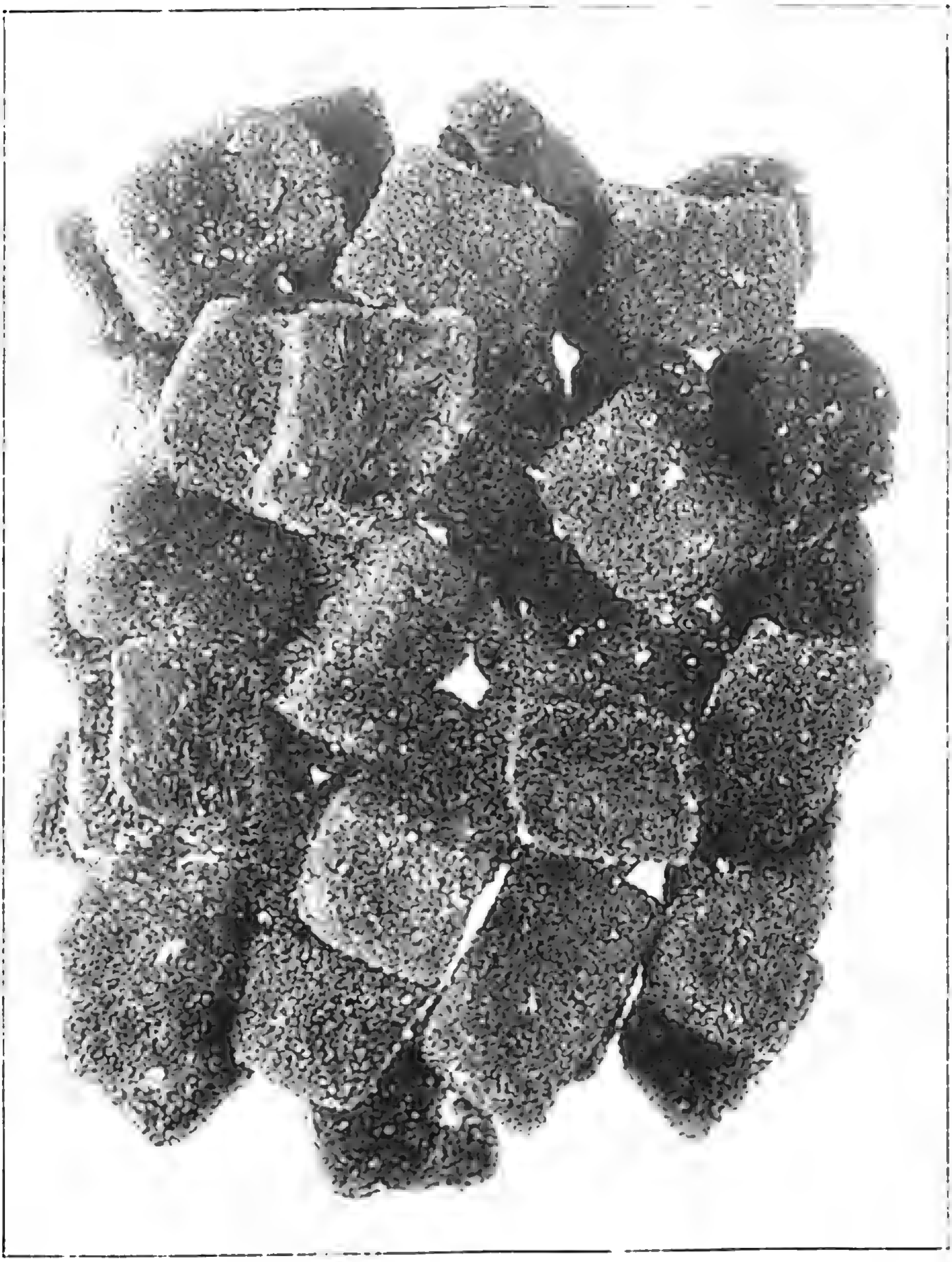


PLATE 113.—A DELICIOUS CONFECTION. SAMPLE FROM BULK OF QUEENSLAND PINEAPPLE TREATED BY AN ENTERPRISING FIRM OF MAUFACTURING CONFECTIONERS AT ADELAIDE.

This method of marketing our Pineapples has great possibilities and deserves all the encouragement growers can give it.

PLATE 114.—OXLEY BACON FACTORY. FOGGITT, JONES, LIMITED, FINE MODERN WORKS ON THE BANKS OF OXLEY CREEK, NEAR BRISBANE, PARTLY DESTROYED BY FIRE RECENTLY.

The whole plant was threatened, but through the fine team work of the employees the outbreak, caused by the fusing of the electric wires, was confined to the Curing Room in which, however, great damage was done. A remarkable recovery was made, and within a week the Factory was again in full operation.

THE CLYDESDALE HORSE.

Queensland Association of Breeders.

The popularity of this famous horse in Queensland was fully demonstrated at the recent Royal National Exhibition, where the displays of Clydesdales, especially in the younger classes, were equal to anything ever seen on the ground.

So keen was the enthusiasm and interest of breeders that a meeting of those interested was convened and held in the National Association Rooms on Thursday evening, 13th August, 1925, for the purpose of discussing the future of the Clydesdale in Queensland.

Among the large number present were Messrs. Jas. Sprott, A. McGowan, Gavin Elliot, J. K. Graham, H. G. Stokes, A. Duncan, W. J. McKee, W. Frood, G. Weier, H. Embrey, J. W. Lowis, F. Harm, O. A. Zischke, Jas. Montgomery, A. Tyson, T. J. Turkington, H. S. Hunter, F. Hamilton, and J. F. Hayes.

Mr. Jas. Sprott was voted to the chair, and in opening the meeting explained the reasons for which they had been called together, and read abstracts from the Clydesdale Stud Book of Great Britain and Ireland. He congratulated exhibitors on the fine display they had made, and the fine attendance that evening was a happy augury for an active organisation to protect the interests of Clydesdale breeders in Queensland.

The matter of linking with the Commonwealth Clydesdale Horse Society was discussed at great length, and it was decided that, although it was the wish of those present to form such a branch in Queensland, the time was not opportune. It was eventually decided to form an association in Queensland to be known as "The Clydesdale Society of Queensland," and officers listed as follows were elected:—President, Mr. Ernest Baynes; vice-presidents, Messrs. A. McGowan and H. C. Quodling; treasurer, Mr. H. S. Hunter; secretary, Mr. J. F. Hayes.

The membership fee was fixed at £3 3s., with an annual subscription of £1 1s., payable in advance. Most of those present enrolled as members.

A subcommittee, consisting of Messrs. Ernest Baynes, A. McGowan, H. C. Quodling, Jas. Sprott, G. Elliot, J. K. Graham, and J. F. Hayes was appointed to frame a constitution and rules for the society.

The Objects of the New Association.

1. Maintenance, unimpaired, of the purity of the breed of horses known as Clydesdale horses, and to promote the breeding of these horses free from hereditary unsoundness as far as practically possible.

2. Collection, verification, and preservation of pedigrees and records of the Clydesdale.

3. Promotion of the general interests of Clydesdale breeders and owners.

4. Investigation, should occasion arise, of suspicious and doubtful pedigrees of Clydesdales, and other possibly alleged misrepresentations relating to them.

5. Arbitration upon, investigation, and settlement of disputes and questions relating to the Clydesdale breed.

6. Affiliation with the Commonwealth Clydesdale Horse Society.

The matter of going fully through the records and pedigrees submitted and the report thereon was left to the secretary, and he was instructed to make every effort possible to trace the pedigrees of sires as asked for, and to prepare pedigrees in proper tabulated form to be resubmitted for consideration as soon as possible.

In order to further increase the interest in the society, it is planned to arrange visits to as many country centres as possible, in order to establish direct touch with breeders.

Applications for registration are now being received, and all letters addressed to the Secretary, The Clydesdale Society of Queensland, care Royal National Association, Courier Buildings, Brisbane, will be promptly attended to, and all possible assistance and information given.

[*Notes on the Clydesdale, which should be of value and interest to owners and breeders, will be a regular feature of the Journal, commencing with the November issue.—Ed.*]

General Notes.

Hamilton Cold Stores.

In the course of a recent Press statement, the Minister for Agriculture (the Hon. W. Forgan Smith) said that the seasonal prospects of agriculture generally were extremely bright and there was every promise of a bountiful season. The recent well-distributed rainfall had greatly benefited the growing wheat, and, to a large measure, has ensured a good harvest. The production of butter and cheese also gave promise of being up to the highest level, and representatives of the Queensland Co-operative Butter Manufacturers' Association had made inquiry from the Department of Agriculture as to the date of the opening of the Hamilton Cold Stores for the intake and storage of dairy products. They were advised that the stores were in readiness to cope with the storage of butter and cheese, and operations would begin immediately it is necessary.

At present, the quantity of butter arriving in Brisbane for storage does not exceed 4,000 boxes per week, and there is ample storage accommodation at the Roma Street Cold Stores. It would not be sound economy to commence operations at Hamilton until the complement of butter coming forward is much greater than at present, unless, of course, the existing storage facilities were inadequate. There is just now no urgent necessity for placing the stores in commission.

Lost to the Farm—The Problem of the Rural Exodus.

The increasing city-ward drift of our rural population is a subject of such seriousness as to have been very anxiously discussed in recent years, and many and various have been the explanations of the trouble. In an effort at diagnosis in a recent "Agricultural Bureau Record," New South Wales, Dr. H. L. Kesteven presents some opinions which should give many farmers thought. An analysis of the drift as indicated by the Government Statistician's figures is followed by these words:—

"Two great factors will determine the movement of individuals: (1) The need of an opportunity to make a living, and (2) the desire for better conditions. At present these factors are working to the relative reduction of rural populations. The operation of the first factor is probably entirely through want of sufficiently rapid land settlement, coupled with the adoption of labour-saving devices in agriculture. The Government Statistician points out that in 1921 it took 10,000 less persons to cultivate the same area that was cultivated in 1911. The increase in rural population has lagged because there was a lagging in the opportunities to make a living on the land.

"This is not the whole explanation. Every reader knows of vacant farms, and of farms undermanned, while sons from the undermanned farms and next door to the vacant farms are now working on the trams, in the mines, or the steel works, or at some other job in the cities or mining towns. Why? Two questions are here contained in one: Why did those sons go away, and why are there none from a city ready to jump into these country jobs?"

Why Do the Boys Go Away?

"Why do the sons go away?" Dr. Kesteven continues. "Mainly, I believe, because of discontent. This arises from causes real and causes imaginary. In the city when a lad leaves school, at whatever age that may be, he begins to make money for himself. He takes a job on wages. It is very rarely that he helps dad in return for his keep and clothes and a little pocket money. In the country it is the usual thing for the son to plough, milk, thresh, and harvest for dad. Dad is usually of a saving disposition, and does not encourage his son in extravagance by giving him much pocket money.

"That is one real cause—now for another. Too many farmers fail to realise that it is possible and very necessary to make the home pleasant. Half the cost of a corn crusher would install all the comforts of a city home so glibly advertised in the 'to lets'—'gas and water laid on, all modern conveniences.' Yet what do we find? The kitchen has a slab floor or none; the tank tap so close to the ground that you can only just get the milk-pail under it; the copper stands in a tripod, the wash-tubs on logs out by the well, and the lamps are narrow-wick kerosene lamps. The cows and horses feed right up to the door, and there is no trace of a home garden. Half or all the rooms are unlined, and none of them have ceilings."

A Vital Cause of Discontent.

"Take the same man into a city on half his earnings as a farmer, and he expects, and gets, all the city conveniences, or rather his wife and daughters do. How can a home be a contented one if the womenfolk are to work and live amid such uncomfortable and depressing surroundings? It is only the cheerful woman who can make the happy home. Can we expect our womenfolk to be cheerful if neglected in this manner? It is sheer neglect, for nearly every farmer could build himself and his family a pleasant home."

These, in the opinion of the writer, are the two great causes of discontent—failure to pay the boys their own earnings, and neglect of home comforts. But country-dwellers, he urges, are far too much impressed by the continual "boosting" of the city's delights; taking all things into consideration, the country-dweller is the better off for the things that are really worth while. The essentials for the production of a compensating current from city to country are set down as, first, more liberal land settlement conditions, and secondly, a cessation of the universal habit of discussing the disabilities of country residents, the bettering of which is in the country-dweller's own hands.

Royal Society of Queensland.

The last ordinary monthly meeting of the Royal Society of Queensland was held in the Geology Lecture Theatre of the University on Monday, 31st August, 1925.

Mr. C. T. White, F.L.S., exhibited specimens of *Bursaria incana*, Lindl., showing variation in foliage.

Mr. H. A. Longman, F.L.S., exhibited specimens of the "Magnificent Spider," *Dicrostichus magnificus*, artificially liberated from a cocoon in which the sexes were distinctly differentiated. The bulbous sexual appendages of the males could be distinguished by the naked eye. In the females the abdomen is larger and is more prominently marked with greenish-yellow spots and the cephalo-thorax is not nearly so dark as in the males. In these spiderlings there is no sign of the two prominent supero-lateral tubercles of the adult. The exhibitor stated that these tiny spiderlings, after ballooning, hid on the underside of leaves, and although they were unable to spin a web they caught tiny moths.

Mr. D. A. Herbert, M.Sc., read a paper entitled "Movement of *Mimosa pudica* as affected by Anæsthetics and Other Substances." The author points out that the term anæsthesia implies a suspension of sensitivity, and in this respect cannot be applied to the action of anæsthetics on *Mimosa pudica*, the power of movement being lost only when the plant is permanently injured. The effect of lipoid solvents on movement was shown to be similar to that of such anæsthetics as ether and chloroform, but enzyme poisons destroyed the power of response only after prolonged treatment. Alcohol, a mild anæsthetic, prevents movement by coagulation of protoplasm. Incidental to the main topic, new facts concerning the nature of conduction and of response are reported.

Carrots a Useful Crop.

The carrot is one of the most easily grown vegetables, but is not cultivated in this State to the extent that it deserves.

Almost any soil can be brought into a fit condition to grow this crop, but a deep, sandy loam is best. A fine tilth should be produced, and care must be exercised in the manuring. Farmyard manure should not be incorporated with the surface soil just prior to planting, but a plot may be selected which had been well manured for some previous crop. Artificial fertilisers will prove beneficial, especially on poor soils. A mixture of superphosphate or bonedust and sulphate of potash, in the proportions of four parts of the former to one of the latter, should give satisfactory results when applied at the rate of 2 or 3 cwt. per acre, but the quantity required depends, of course, on the richness of the soil. Artificial manures, in conjunction with a plentiful supply of water, result in early maturity and crispness—the latter being a most important factor.

The soil should be deeply tilled to allow of the full development of the roots, and early preparation of the land is recommended. The rows can be sown fairly close—usually from 12 to 15 inches apart. This permits of the use of hand wheel hoes for cultivating. The seed can be sown either by hand or by means of a hand seed-drill, planting to a depth of about half an inch. Fresh seed should be used, and may be mixed with sand to allow of a uniform sowing—the needs have a tendency to stick together on account of being slightly hooked. After sowing the seed should be firmed in, and then the soil loosened on the surface. If the germination is good it will be necessary to thin the plants slightly to prevent wedging, and as the roots develop the larger ones should be removed as soon as they become large enough for use. By this means the usefulness of the bed is also

increased. A spring sowing should provide carrots fit for use from a few months after planting right on throughout the winter. The spring sowings are the most satisfactory, as the plants become properly established before the hot weather is experienced. Sowing can, however, be carried out during the summer months, and with proper care and attention to watering and cultivation, good crops may be obtained. Four pounds of seed are required to sow an acre.

The harvesting is a simple matter where the soil is of a light texture, the crop being very easily pulled out of the ground. But should the soil be at all compact or hardened, or the carrots very long, it will be necessary to loosen the soil with a fork or by ploughing a furrow alongside the row. The crop is usually marketed in bunch form, but may be sold loose by the bag. For the best returns it is advisable to wash the roots before selling.

For the earliest crop, and on shallow soils, the shorthorn type (Early Horn or Early Nantes) is preferred; for main crop, and on deep soils, the longer varieties are best suited, namely, Intermediate, Altringham, Danvers, and Manchester Table.

During the cool months the roots may be stored by pitting in sand, something after the method of storing potatoes in pits. It is usual to cut off the top growth before heaping.

Teaching Dad.

Dad used to say old-fashioned pigs were good enough for him, Why pay a lot of extra dough to get a name thrown in? He bought a saw-toothed razor-back with flattened, turned-up toes; With all the curl out of his tail, and with a Roman nose. This pig was built for climbing trees, could outrun all the steers; His hide looked like a picket fence, his knees were wearing thin; His front legs bent together close to keep his lungs tucked in. His front and hing legs didn't match; he slanted like a roof; His ham looked like a frying pan that ended with a hoof; His hair was coarse and thin and long, where lice hatched, lived, and died; They had to work themselves to death at cutting through his hide. Well, he ate corn and fed the lice but managed to keep thin, So father said he'd fatten him and then we'd cart him in. He fed him corn out on the ground—he got what wasn't wasted, Dad used so much expensive feed the silver must have tasted. About the time the corn gave out we found he'd changed his diet; Where all Mum's chickens used to be, was feathers now and quiet. That settled things for Mum and Dad—she sued him for divorce; Dad sold the pig for court expense and took to drink, of course. The butcher tried to kill that pig with only just an axe; At last they used a Mills' bomb, if what they say are facts. They made him into sausage meat, and sold it in our town; The butcher lost his happy home—the people burned it down. About this time the pig instructor organised a club, To get us kids to raise a pig that wasn't just a scrub. He taught us how to feed it, too, and made us dip and spray, He said unless you used your head you couldn't make pigs pay. We boys were game for anything and gave the thing a try, We vowed we'd show these scrub pigs up and prove what kind to buy. Dad laughed at me for thinking I could make a porker pay, He said experience on the farm beat theory any day. I planned I'd give both a try and mix them up a bit; I cleaned and sprayed Mum's chicken house—she had no use for it. And then I bought a purebred pig—bid for her at a sale, She had good bone and silky ears and curlers in her tail. I fed a balanced ration, made her beat a pound a day; Dad, he sort of changed his tactics, couldn't think of much to say; Whistled—easy, but I heard him—when we drove her on the scales. Six months old and weighed two hundred—figures tell no fairy tales. But I broke another record when I sold her—that won Dad. Just ten quid for a breeding sow you bet was not too bad. Dad has changed his way of feeding, has purebreds instead of scrubs, Now we own a purebred motor, leave the Fords for mossback dubs.—Adapted.

Poultry—Work for the Brooder.

The main essentials in brooding are (*a*) warmth sufficient to keep the chickens comfortable; (*b*) pure air; (*c*) good food and water; (*d*) good sanitation; (*e*) ample room for exercise.

With regard to (*a*), this does not mean that chickens should be reared like a hot-house plant in an even temperature all the time. That would be the worst form of brooding. What it does mean is that the temperature provided should be such as will enable the chickens to take advantage of it even in the day time as soon as they feel the cold, and at night it should keep them sufficiently warm, so that they will not be forced to congregate and close up in order to be comfortable. It is no use to say the brooder, or the house, is large enough for many times the number of chickens being run. Space will not prevent packing, nor will the ingenuity of the attendant in rounding off the corners or any such attempted palliatives prevent "crowding"; only sufficient warmth will do that, and no matter whether it is applied (as in heated brooders) or conserved (as in the fireless arrangement), the principle is the same.

In the latter system strips of flannel, or some such woollen material, is the means whereby the bodily temperature is preserved, and whereby the chickens are divided to some extent from too close contact with one another. Trouble arises here when the flannel strips are lifted above the chickens and they can no longer nestle among them. This is one of the main troubles in cold brooding. With heated brooders, trouble commences just as soon as the temperature falls below what is required to induce the chickens to spread out.

It is not so much the cold that hurts the chickens as the crowding together, and the sweating that consequently takes place. It is not too much to say that 95 per cent. of chicken trouble arises from this cause. Strange as it might appear, nearly all the cases of illness arising from this simple cause are put down to coccidiosis, white diarrhœa, or other chicken diseases. If poultry-farmers would look closely into their brooding there would be very little heard of the diseases mentioned.

No harm can come from high temperatures if the brooder is so constructed as to allow the chickens to get away from the heat to a more temperate zone. Trouble from over-heating can only arise where the chickens are shut in and confined to it. Chickens, like any other animals, can be relied upon to seek comfort, and that will resolve itself into a temperature that is best suited to their bodily requirement.

Pig Feeding.

Lucerne, either for grazing or for cutting and feeding in the sty, is the best green feed for the boar, sows, and young pigs. Wheat, oats, rye, and broadcast maize are also very suitable as green feeds for grazing; climbing varieties of cowpeas can be sown among the maize.

Sorghum should be fed only when matured. Rape is a fine winter crop, ranking next to lucerne for grazing purposes. Jerusalem artichokes are very drought-resistant, and grow well in light soils. The pigs should be turned in to harvest these after the plants have flowered.

Sweet potatoes, suitable for warm districts, are good for pigs when fed with a small percentage of maize or other grains, and skim milk; they are utilised in the same manner as artichokes for grazing.

Sugar beet and mangolds are excellent feed fed raw, and can be readily stored in a pit. Potatoes should be boiled and fed with skim milk or maize; the water in which the potatoes have been boiled should not be given to the pigs.

Pumpkins can be largely grown; they should be fed raw. Wheat and barley should be crushed and steamed for a few hours and fed with skim milk or whey.

With regard to mill refuse (pollard, bran, and sweepings), the market value of these determines whether it pays to feed on them or not, but a very little pollard mixed in milk keeps pigs growing and fattening well. Bran, which is properly rather a laxative than a pig food, is very useful for brood sows. Sweepings from mills, &c., should be used carefully, as they often contain a lot of rubbish. It is wise to soak the sweepings, so that any nails, nuts off bolts, or similar dangerous foreign objects may sink and be separated.

Skim milk, butter-milk, and whey are widely used as food for pigs. Skim milk, which should be fed with crushed grains or pollard, is a good flesh-producing food. It should not be used straight from the separator, but allowed to stand an hour or so, so that the gas may work out of it. When feeding butter-milk, always add pollard or crushed wheat, barley, or maize; otherwise the pigs will be soft and blubbery when dressed. Whey also should only be fed when mixed with crushed grains.

To avoid any chance of tuberculosis, all milk products should be boiled before being fed to pigs.

Quality Counts—The Curse of the "Intermediate" Milker.

Notwithstanding the self-evident fact that cows vary greatly in milk-yielding capacity, it is difficult to get most dairymen to keep any sort of record of the quantity of milk obtained from individual members of the herd. It is the "intermediate" cow which is the curse of many herds, says A. W. Bethune in the Journal of the Victorian Department of Agriculture.

If she were a really worthless milker, the most careless dairy farmer would get rid of her, but on account of her fairly high milk yield when freshly calved, or her ability to produce just enough milk to delude her owner into thinking she is paying her way, she retains her place in the herd. It is this class of cow which it is very difficult to detect, except by a systematic daily or weekly weighing of milk over a lactation period. Even those herds which have a high average milk production, but in which weighing and recording is not practised, would be improved by a vigorous milk-recording system, as there is almost sure to be one or more cows whose milk yield would be much below the best cows, and which could be culled and replaced with advantage.

If dairy farmers who have to buy the greater portion of their fodder (as do those in metropolitan districts) would only realise what the saving to them in money would be by making full use of the scales, and by culling the duffers and the cows that are not quite good enough, there would be nothing like the number of struggling dairy farmers and of failures there is at the present time. An average full-grown dairy cow requires approximately 10 tons of fodder per year for the maintenance of her body, and for every 75 gallons of average milk produced approximately an additional ton of fodder is necessary. Thus, one cow producing, say, 750 gallons of milk per annum, consumes 20 tons of fodder during that period (10 tons for maintenance and 1 ton extra for each 75 gallons of milk yielded), while two cows, each giving 375 gallons of milk per annum, consume 30 tons of fodder for the period (10 tons each for maintenance of their bodies, &c., and 1 ton for each 75 gallons of milk produced). It requires very little arithmetic to show that the saving in fodder by having the one good cow in place of the two inferior ones amounts to 10 tons—a big item in itself, but one which must be multiplied many times in the case of a heavily-fed herd containing a number of inferior cows. As well as the saving in money, there would be a corresponding saving in labour; there would be less stock on the premises, yet more milk would be produced.

On every dairy farm there should be none but good cows, capable of producing from 700 to 800 gallons in a lactation period of from nine to ten months, and heifers that will give from 400 gallons up, according to age.

It is only too true that for some unaccountable reason there exists in the minds of many prospective dairy farmers, whose practical experience of the industry is very limited, the idea that less capital is required with which to begin dairy farming than to start any other business. It is this ignorance, combined with a want of financial backing, which often leads a new man to commence with a herd of nondescript cows, and thus begins a hard struggle, to be continued till at last he becomes disheartened or fails financially. Too often the dairy farmer thinks it is numbers that count, whereas the successful man's motto is "Quality before quantity."

The Slippery Slide to Failure.

There are a number of practices that tend to failure at dairying. Following, taken from an American paper, are a few:—

1. Buy any old cow, so long as it is a cow.
2. Buy the cheapest food, if any, regardless of its content.
3. Do not weigh the grain or milk, or do anything advised for dairy improvement.
4. Be careful not to test—your grandfather got along without it.
5. If the cows don't move smartly, prod them with a fork or milk stool—it brightens the animals up.
6. Milk and feed the cows when the notion strikes you, or let them go over one milking; there is nothing in regularity.
7. Breed your cows to any sort of scrub bull, no matter of what breed, so long as they will freshen once a year or so.
8. On no account join a co-operative bull or cow testing association, nor buy a purebred dairy bull. Such new-fangled notions label one as a person who will bear watching.
9. Persevere with these methods—you can depend upon them breaking you in the end.

Watering Dairy Stock.

The system of watering dairy stock from earth tanks cannot be recommended, the tanks being quickly polluted by the excrement of the animals which use them, and by the surface drainage when the adjacent land is flooded. Too often one sees cattle drinking from such tanks when the water is dirty and stagnant; some farmers even use this water for washing dairy utensils, with consequent contamination of the cream. The position is improved if, when the earth is being scooped out, it is placed all round the outside of the tank, thus preventing the inflow of surface water. It is not uncommon to see tanks very boggy around the sides. This causes a good deal of straining and twisting for the cow when turning to walk out, with possible injury.

When earth tanks are used for dairy stock, they should, if practicable, be fenced off and the water pumped by a small windmill into an overhead tank for the supply of troughs. There will thus be made available wholesome drinking water for all stock, as well as a convenient supply for washing the bails and spraying the yard to lay the dust prior to milking.

Kikuyu Grass—Are There Different Strains?

Inquiries are reaching the New South Wales Department of Agriculture from many country centres, especially the drier parts of the State, as to whether there are two strains of Kikuyu grass, which are spoken of as Belgian Congo and South African; also whether either of these is harmful to stock, and if there is any truth in the claim that this grass is superior to lucerne and other well-known fodder plants in respect to withstanding cold and drought.

In a report which has been furnished by the Agrostologist it is made clear that there is only one strain of Kikuyu, which was imported to New South Wales from South Africa about seven years ago, but it is understood the grass is native to Belgian Congo, also British East Africa; hence the impression that there are distinct strains. Being of identical origin, there can, of course, be no question of superiority between plants imported from South Africa and others brought direct from Belgian Congo. Similarly, this grass is not in any way injurious to stock, as large areas are planted in coastal districts of the adjoining State, where the plant thrives exceedingly well, and is superior to paspalum, being more resistant to drought and frost. It is, however, primarily a summer grass, and for winter feeding it is inferior to other grasses, such as *Phalaris bulbosa*, Tall Oat, and Tall Fescue in such districts. In regard to lucerne, it must certainly take second place, as lucerne is not only of better feeding value, but will grow in most places where Kikuyu will succeed. The latter will only thrive in districts having a good rainfall, and its cultivation in the drier portions of the neighbouring State is not recommended.

The advantages of Kikuyu in smothering bracken, sorrel, and certain other noxious plants are well known, but in view of the restricted area in which it will thrive its usefulness in this direction will not, of course, extend to the drier parts of the State. Its smothering habits, useful in the directions indicated, make it unsuitable for planting in areas, such as alluvial flats, that are likely to be used at a future date for cultivation purposes.

Foul Brood in Bees—Sterilisation of Infected Combs.

There is still very much doubt in the minds of professional apiarists as to whether combs infected with American foul brood (*Bacillus larvæ*) can be effectively sterilised and made fit for use without a recurrence of the disease in the hive, and at a figure that will make the treatment of such combs a payable proposition, writes the Apiarist, Hawkesbury Agricultural College, in the "Agricultural Gazette" of New South Wales. The discovery in 1922 of a method of treatment by Dr. Hutzelman, who used a 20 per cent. formalin-alcohol solution (the mixture now commercially known as Hutzelman's solution) was received by bee-keepers with much interest, but little hope was entertained that this method would ever be practicable on account of the high cost of the solution, and excessive evaporation that took place during the process of treatment. It will be a matter of interest to bee-keepers to learn that a formalin solution with water as a diluent has given results equally as effective as the Hutzelman patented solution.

The writer then quotes D. H. Jones, Professor of Bacteriology, Ontario Agricultural College, Canada, as follows:—"The questions we wished to decide in the experiments were, first, whether or not Hutzelman's claims could be substantiated; and, secondly, whether or not the use of water as a diluent could be substituted for alcohol with satisfactory results. Accordingly, combs were immersed for twenty-four and forty-eight hours, respectively, in various aqueous dilutions of formalin, alcohol dilutions of formalin, and Hutzelman's solution, after which cultures were made from the larval scales.

"It will be seen that in the case of uncapped cells, after twenty-four hours' immersion in all dilutions of formalin used, the spores of *B. larvæ* were killed. In the case of the capped cells, however, a few of the spores were not killed in this length of time, either in the water dilutions or in the Hutzelman solution.

"After forty-eight hours' immersion, however, all spores were killed in capped cells as well as uncapped cells. Thus, in these experiments, the water dilutions of formalin proved to be as effective as the alcohol solutions in destroying the spores of *B. larvæ* as they occur in the scales of infected brood combs.

"On removing the combs from the formalin dilutions, strong odour of formalin persisted on the combs for days. As this odour is strongly objectionable to bees, attempts were made to get rid of it. The method that gave the best results was washing the combs under the water tap immediately on removal from the formalin. The combs should be held in a slanting position and passed backwards and forwards and from side to side under the free flowing tap. In this way all traces of the formalin can readily and easily be removed, after which the combs are stood up to dry."

Similar tests were also made with certain proprietary disinfectants in varying proportions, but in each case growth of *B. larvæ* was obtained from combs immersed in solutions for periods varying from forty-eight hours to eighteen days.

From the foregoing report, bee-keepers may reasonably hope that, by widespread and consistent effort in districts badly infected with American foul brood, the enormous losses of those who are at present compelled to boil down their combs may be overcome.

Tobacco-Growing in the South.

Field experiments alone can determine whether a locality will produce a suitable type of tobacco. The plant is adaptable to many classes of soils, but its aroma, yield, and habit of growth are affected by climatic conditions very considerably. Generally, it will be found that "leaf" useful for commercial purposes cannot be grown within 15 miles of the sea, as the "burn" of the leaf is seriously affected by the chlorides in the soil and atmosphere.

There are many varieties of tobacco, all types of which are highly susceptible to a change in locality. If seed be imported and grown for a number of years, it will be found that ultimately the plants will assume characteristics common to the new locality, and lose their original distinctive features. The market in Australia is for Virginian leaf suitable for pipe and cigarette tobacco.

Each country produces a leaf having it sown particular burning aroma, and American aroma has become the standard for leaf used in the manufacture of Virginian pipe and cigarette tobaccos. The burning aroma of leaf so far produced anywhere in Australasia is totally different, though in many cases it would not be possible to discriminate on its appearance. In Australia the locally-produced leaf is principally used for blending purposes. Hence, the more neutral in the above respects the Australian leaf is, the greater the quantity for which use can be found by the manufacturer.

The largest amount of leaf is generally produced in the northern portion of New South Wales, but in quality, and more particularly in its qualities of burning aroma, tobacco grown in the southern portion of the State much more closely resembles the American article. This is probably due to the better rainfall and cooler nights during the growing period.

The crux of the position as to tobacco is the burning aroma, and all processes lead up to the attainment of a product pleasing in that respect and acceptable to the palate. The manufacturer of tobacco is prepared to pay up to 3s. per lb. for the best leaf in Australia, whereas a manufacturer of flour is only prepared to pay in the neighbourhood of 1d. per lb. for wheat, and a little more for maize. The fact is, the skill and science which must be devoted to the production of tobacco is very much greater than that necessary for the production of wheat and similar crops—partly because "production" in the case of tobacco involves a vital and very delicate secondary process.

One crop is for the small man tilling a small acreage under constant advice during growth and maturing of the crop; the other is for a man with a large acreage, using machinery to put in his crop, and then doing practically nothing until harvest time, when it is harvested by machinery and sold just as it is taken off the field. With tobacco the harvesting is only a part of the work. Flue-curing is a process which must be carefully watched day and night—and hourly—for six days, and the slightest error in judgment in the regulation of temperature or humidity may result in a most serious loss. After flue-curing a careful watch must be kept on the tobacco when it is placed in bulk and undergoes a further process of maturation.

Climate and the physical characteristics of the soil must be carefully considered, and (as stated before) actual field trials must be carried out before one can determine whether a locality or farm is suited to the production of a marketable tobacco.

Heavy rich soils invariably produce rank tobacco, as also do soils with a clay subsoil close to the surface. Standing water very quickly affects tobacco. The best ground is a sandy, friable, deep, well-drained loam, which contains lime and a clay content of not more than 8 per cent. Such a soil is suitable for almost all classes of tobacco. Within reasonable limitations, the more sandy a soil is the better will be the quality of the tobacco. Clay should be avoided in all cases.

Four acres appears to be a safe area for one man to work. Experience shows that the most consistently prosperous grower is the small-area man. In large areas labour difficulties arise. Few crops require such assiduous and careful handling—from the time of planting out until the day when the leaf is received in the warehouse—but the good grower is usually well recompensed for his trouble and labour.

There is a fixed market in Australia for flue-cured leaf, but no market for the old type of air-cured leaf.—Agr. and Pastoral Notes, N.S.W. Dept. Agr.

Ill-fitting Harness—Look at it from the Horse's Point of View.

Much depends upon the tractive power of the horse, and its effective utilisation necessitates the adoption of harness which will not in any degree tend to depreciate the value of his strength. The price of all horses, whether used for light or heavy draught, is extremely high, and, even apart from considerations of comfort, it does not pay owners to have their horses laid by through injuries contracted in the course of their work. The harness is necessary to enable the animal to exert his strength efficiently, and in selecting the harness it must be remembered that while securing this, it must not cause more than the unavoidable minimum of discomfort. No horse put in harness should suffer any inconvenience except that arising from fatigue. Unfortunately, however, through lack of knowledge of the proper adjustment of harness, many horses do suffer considerable pain while at work. This gradually leads to temporary incapacity, and in some cases to permanent injuries, such as fistulous withers, &c.

Many vices—for example, jibbing and bolting—have their origin in badly-fitting harness. When the horse is compelled to work in an unsuitable collar, the undue pressure on any part of the shoulder causes chafing and soreness, and the horse naturally recoils from what causes him agony. Ultimately, the best-tempered beast becomes vicious and uncontrollable, through nothing but culpable ignorance on the part of his driver.

Every horse differs in size and shape, and to fit him properly, it is necessary to use much care. It is not sufficient to depend upon the saddler to fit horses with their harness. The owner should know the use and proper adjustment of every part. Wrung shoulders frequently occur through leaving the selection to the saddler, who, rather than go to the trouble of obtaining a proper collar for a horse that is difficult to suit, may choose the nearest fit in his ready-made stock, and justifies his choice by the contention that the collar will soon adjust itself to the shape of the shoulder. If it is not a good fit in the first instance, it will never become so, and in the so-called self-adjustment it is quite possible that the horse will be permanently injured.

The Care of the Young Pigs—The Time of Woe for Weaners.

Weaning time is a very critical period in the life of a pig. If the young pig has been given feed in addition to what it has received from the mother, it should have made a good start and should then be fed, at least twice daily, all that it will eat up clean. The young pigs should have the run of good fresh pasture if possible, and should be fed on crushed grains, pollard, and skim milk, with lucerne, rape, or barley as green feeds, or pumpkins, mangolds, &c., if possible. All slop feed should be fed while sweet, and should preferably be given warm, after having been steamed for about four hours. The steaming of such grains as are given is attended by better results than merely soaking. The pigs should have a shallow wallow (preferably of concrete) in which the water is kept as fresh as possible. Wood ashes, cinders, and a piece of rock salt should be available in the yards, which should be provided also with a dry shelter shed and bedding. Too many pigs should not be kept in one yard. When about three to three and a-half months old, any boars that may have been kept should be separated and placed in different small paddocks, where they should be kept until ready for penning prior to marketing as porkers or baconers.

An important point is always to have the pigs graded, so as to keep the same-sized animals together, thus preventing large pigs from jostling the smaller ones at the feed trough. Pigs will be found to do much better if a system of grading is in force. Approximately, forty pigs can be run to the acre, but the exact number will depend upon the size of the animals and upon the pasture provided.

The Food Value of Cheese.

Cheese is a food second to none and cheaper than any commodity (or group of them) of similar food value. Its extremely high food value, both as regards protein and total energy, entitles it to a much more important place in the diet than it has commonly been given in this country.

It has been demonstrated that, contrary to the general impression, cheddar cheese is neither indigestible nor constipating; indeed, 95 per cent. of it is digestible and 90 per cent. of its energy is available. The protein value of 1 lb. of cheddar cheese is equivalent to 2 lb. of sirloin roast, 22 eggs, or 3 lb. of fish. To equal the energy value of 1 lb. of cheddar cheese, 2 lb. sirloin roast, 26 eggs, or over 6 lb. of fish are necessary. As a substitute for meat, cheddar cheese holds first rank both in regard to food value and relative cost. Instead of being used solely as an appetiser or condiment, cheese is worthy of, and should be given, a substantial place in the diet.

No mention has been made of the indispensable dietary constituents known as vitamines. Fat-soluble A and water-soluble B are both present in cheese. Butter-fat contains fat-soluble A in abundance. Vegetable oils do not furnish this vitamine, neither are the body fats of animals, such as lard or beef fat, important sources of it.

Unfortunately, points out a senior dairy instructor of the Department of Agriculture, too much cheese of very inferior quality is passed out for consumption, and this has had a very much greater retarding effect than one would at first imagine. "Picture the man (and there are thousands of them) who daily lunches on bread rolls and butter; who, feeling he wants more, calls for cheese, and receives a piece which is bitter or has a bad smell, or in appearance is uninviting. He probably eats it, but with every mouthful conceives a deeper prejudice against cheese. Good cheese, on the other hand, has the very opposite effect, the man's palate clamouring for more of the thing that is pleasing. Thus good cheese establishes a habit, which is persisted in till the bad piece comes along again."

Modern Farming.

The essential difference between the new methods of farming and the old is that the old rule-of-thumb methods are being superseded by those which are based on a study of the conditions under which crops grow, and of the relationship of the growing plant to soil and air and water.

These new methods have become necessary because of the changed conditions under which farming is carried on. The number of people who have to be supplied with food is continually and rapidly increasing, competition is getting keener, the available land of good quality is diminishing, and poorer land or land in a less favourable climate has to be opened up, and the need has arisen of utilising to the utmost the resources of the soil. This is only possible by the application of principles which science has discovered. This does not mean that the farmer must necessarily be a scientific man, but it is becoming every day more and more necessary that he should understand something of the principles on which farming depends.

Agriculture is an art, and it is an art that was practised centuries before the sciences were born with which it has become associated in modern times. Man raised corn and made bread and wine thousands of years before he knew anything of the constituents of grain and grape, or the nature of fermentation, and a man can to-day be a thoroughly successful farmer without knowing anything about botany or pathology, or entomology, or chemistry. Nevertheless, the farmer of to-day, working under modern conditions, cannot afford to neglect the teachings of science as far as they affect his own art; and that farmer will be the successful one who is able to understand what science has to tell him, and to utilise the weapons which she puts into his hands. And agriculture is indebted to science not only for the knowledge of useful facts and principles, but in a still higher degree for the scientific method of work, the spirit of inquiry, the patient, accurate, and systematic attention to the minutest details. Without this, the farmer becomes a mere sowing and reaping machine, incapable of progress, and at the mercy of adverse seasons and crop diseases.

The Need for Better Horses.

Although the day of the horse is by no means past, urges a writer in the "Agricultural Gazette" of New South Wales, the day of the inefficient horse is numbered. Horse users to-day want a better article, and horse-breeders would be well advised to keep abreast with the demands of the times, and produce the class of goods which is wanted and sells best.

The carriers, merchants, and brewers of Sydney complain of the great difficulty they have in securing horses of the right class for their work. The markets are flooded with under-sized, scrubby types, for which there is no demand. Farmers should be in a good position to breed the class of horse which is wanted in the city, as by breeding a few they can give them more attention, and so help their development. The horse with weight, good appearance, and with hard, flat bone and sloping pasterns is the sort required. The best class of draught horse in Sydney is to be found principally in the brewery lorries, and it would be a good education for any farmer or horse-breeder when in Sydney to visit the stables of the brewers and inspect the horses. That there is a demand for good horses cannot be too strongly impressed on breeders. They city user wants a better standard of animal and the farmer also wants a more efficient horse. The satisfaction of this requirement lies in the hands of the horse-breeder. Is he, by breeding and rearing a bad, nondescript type of horse, going to discredit horse-breeding, or is he going to produce a horse of better standard which will give more efficient service on the farm or in the city? By breeding nondescript animals, sending them into the city markets in an unfit state, and expecting top prices, sellers show a lack of business acumen. No wonder carriers and others who are anxious to procure good horses become disgusted and turn their attention to motor power.

The Menace of the Mongrel Sire.

The average horseman in this State, says the same writer, has shown a great deal of apathy in all matters connected with the breeding of horses of higher standard. While legislation to prohibit mongrel and unsound sires is essential, there is no reason why breeders should wait for Government action before trying to do something for the improvement of horses. The lack of progress and improvement in horse-breeding in this State is to a large extent due to the use of sires deficient in breeding and quality, and the failure on the part of owners of mares to recognise the necessity for patronising pure-bred, sound sires of good conformation. The neglect, too, to adopt a more rigid culling of breeding mares is a big contributing factor, and to this, and to the use of undesirable sires, is consequently attributable the low standard of the horse, which, on account of showing unprofitable results, has led to decreased breeding.

Everything possible should be done to improve the standard of draught horses, to increase their value, and to render them more efficient for the work for which they are intended. The greatest menace to the industry has been the cheap stallion, and it is to be deplored that legislation has not been brought into force to eliminate this class of animal. The breeder himself, however, is largely to blame, on account of his short-sightedness in patronising such horses and encouraging their use, simply because they are to be had for a small fee. Anything cheap in the horse line is dear in the long run. If breeders would realise that "like begets like" they would know that the union of the average farm mare with the cheap, nondescript sire, lacking in breed, type, and quality, must result in progeny which can, at best, be no better than either parent—a foal which can grow only into an indifferent horse, lacking desirable working qualities, and, on account of its poor type, of little value in the sale-ring.

Comfort in the Piggery.

We are told that there is no animal on the farm that is more likely to suffer from colds, caused by lying on damp floors or in draughts, than the pig; and yet there is none that is, as a rule, so carelessly provided for with buildings. Anything seems to be thought good enough for a pig-sty, either in design or construction—few, indeed, can be said to have any design about them at all.

The class of sty usually provided for the pig is placed in a corner of the yard, and consists simply of posts and rails (round saplings usually) for walls, and a few sheets of bark for covering, but no floor. The trough may be either a half hollow log with ends nailed on, or a log mortised out of the solid lying in another part of the yard and half buried in the soil. A pig housed as described cannot give as good results for the feed it consumes as another more comfortably housed, and to the man who is rearing pigs for profit this should be a serious consideration.

Bees—Points for Beginners.

Success or failure is often determined by the method of beginning with bees; and it is well to avoid if possible the purchase of bees in old boxes and the consequent necessity for transferring, which process is itself sufficient to dampen the ardour of one who is unacquainted with the work. There is also the risk of introducing disease. The better way is to purchase outright a hive (or hives) which (unless purchased from a reputable breeder) have been previously examined by an expert to certify their freedom from disease. Consult a text-book and become familiar with the queen, workers and drones, and their life history and functions.

This is a most fascinating study, but it sometimes prompts the too frequent disturbance of the bees, much to their detriment. Guard against this practice, and handle them as little as possible apart from the occasions when they need attention. Allow the bees to swarm once, in order that experience may be gained thereby, and follow closely the text-book methods of preventing "after" swarming. Bear in mind that one strong colony will store a greater surplus of honey than two of medium strength. Study the main sources of the honey flow, and aim at having colonies at their maximum strength before it opens. Remember, that upon the queen depends all that is hopeful in bee-keeping. The Italian strain is prolific, quiet, and an excellent honey-storer. Queens of this strain can be bought and introduced to any hive of bees, following the directions supplied with the cage.

In handling bees, use the smoker judiciously and avoid punishing them unduly. Harshness and hasty motions are quickly detected and resented; hence, all operations should be carried out gently, deliberately, and without fear.

Successful bee-keeping, in effect, is the application of various principles for the purpose of so repressing natural colonising instincts that the bees' entire strength is utilised in the storing of honey. In their efforts to this end it is not surprising that we find among amateur bee-keepers so many keen experimentalists. While this

spirit is to be admired, it is found as a general rule to be carried too far, and much time and energy is wasted in trying out methods and appliances that have long since been weighed and found wanting by experts in the craft.

Something for Nothing.

"Gleams of humour," says a writer in the '*New Zealand Fruitgrower and Apiarist*,' "are sometimes to be found in appreciative letters sent by our correspondents, and we cannot resist mentioning a certain Scot who wrote to us to thank us for sending a supply of Aphelinus, and said that he particularly appreciated it, as he had now achieved his life's ambition, viz., to receive something really worth having for nothing."

Woolly Aphis Parasite from New Zealand—Minister's Act Appreciated.

Thus a writer (Dr. R. J. Tillyard, M.A., D.Sc.) in the "*New Zealand Fruitgrower and Apiarist*" in the course of a reference to the distribution of *Aphelinus Mali*, a parasite of the woolly aphis:—"Good progress has been made with the establishment of the parasite in Queensland during the past year. In Queensland, where apple-growing is confined commercially to an area of about sixty miles by twenty, in the Stanthorpe district (elevation 2,500 to 4,000 feet) the Entomologist-in-charge at Stanthorpe, Mr. Hubert Jarvis, reports most enthusiastically on the results obtained in less than two years, and claims that already the Woolly Aphis is practically under control without any further need of spraying.

"An appreciative letter of thanks has been received from the Minister for Agriculture in the Queensland Government (Hon. W. Forgan Smith), and it is perhaps worthy of note that such a graceful action has come only from a Labour Government."

Blue Mould of Tobacco.

This disease makes its appearance particularly in seasons when the rainfall is excessive. It is due to a fungus, *Peronospora* sp. As in the case of most fungus diseases, a particular relationship must exist between the weather, the plant attacked, and the fungus before the latter can establish itself and spread with rapidity. Blue mould especially attacks young plants in the seed-bed, and if it makes its appearance when the particular relationship above referred to exists, it spreads so rapidly that the whole seed-bed may be damaged in the course of a few days.

The fungus makes its appearance on the *under* surface of the leaves, which appear to be covered with fluff of a faint violet tinge. This fluff consists of fungus threads which come out from the leaf and branch freely, each branch bearing at its extremity a small oval spore; these spores are produced in millions. Another kind of spore (known as an oospore) is produced within the tissues of the host plant. It can remain dormant much longer than the other form of spore, hence old diseased plants should be burnt. The fungus threads travel in the tissues of the young leaf, absorbing nourishment and causing it to wither and rapidly die. Attacked plants early lose their bright green colour, and a practised eye can quickly detect the change.

Methods of control must aim at preventing conditions favourable to the development of the disease. They may be summarised as follows:—

1. Prepare a number of seed-beds, suitably manured, so that the young plants may quickly become established.
2. Sow these beds at intervals of two to three weeks.
3. Do not over-water the young plants; excessive moisture favours the disease.
4. Allow the young plants plenty of air and sunlight. Plants grown under hessian are more liable to develop the disease than those grown under straw.
5. Transplant at the earliest opportunity.
6. If the disease makes its appearance in any one of the beds, pull up and burn the infected plants immediately, and spray the remainder with Bordeaux mixture (2-2-50).—A. and P. Notes, N.S.W. Department of Agriculture.

Sulphur as a Fertiliser.

Experiments have been conducted in two seasons at Yanco Experiment Farm, New South Wales, with sulphur as a top-dressing. A lucerne stand was chosen for the purpose, and applications were made of sulphur only and of sulphur and superphosphate together.

The only definite conclusion that can be arrived at, reports the experimentalist at the farm, is that sulphur alone as a fertiliser for lucerne is a failure. The first season's results seemed to indicate certain possibilities in the use of sulphur and super-

phosphate combined, the comparisons being made with unfertilised plots, but the second season the comparisons were made with plots that had been top-dressed with superphosphate, and the previous season's results were not confirmed. The yields from the sulphur and superphosphate plots showed a slight increase over the checks (which has been top-dressed with superphosphate only), but they had the residual effect of the previous year's top-dressing, and allowing for differences due to local variations in the soil, &c., the increase in the yields of these plots is not commensurate with the extra expenditure incurred, and not consistent enough to warrant the recommendation of the practice of applying sulphur as a top-dressing to lucerne.

To Combat Fungus Attack.

Most diseases of plants are caused by low forms of vegetable life, known as fungi, which live upon and within the tissues of the higher plants. The main difference, other than size, between the fungi and the higher plants is the lack of the green colouring matter so abundant in the higher order of vegetation. The methods of development in the fungi are often different from those of higher plants, and their microscopic size renders their study more difficult. The parasitic fungi spend the winter months mostly within the living and dead vegetable tissues, and during the early spring days send out small spores, which correspond to the seeds of the higher plants. These spores are disseminated by the wind and other agents from plant to plant. With favourable conditions as to moisture and warmth, the spores send out small branches, which penetrate into the living tissues of the higher orders of plants.

By the application of a fungicide to a plant we destroy the spores which found lodgment upon it, and thus prevent the development of additional spores which would cause disease. Just as long as the tissues of plants are covered with a thin, even coating of fungicide, very few fungi can develop upon them. The principal fungicides used are Bordeaux mixture and lime-sulphur.

Instructor's Itinerary.

The following itinerary has been arranged by the Instructor in Pig Raising, Mr. E. J. Shelton:—

Sunday, 4th October.—Leave Brisbane for Maryborough.

Monday, 5th October.—Leave Maryborough for Biggenden, thence per car to Dallarnil; Lantern Lecture, Public Hall, 8 p.m.

Tuesday, 6th October.—10 a.m. State Schools, Dallarnil and Woowoonga. Biggenden: Lantern Lecture, Biggenden State School, 8 p.m.

Wednesday, 7th October.—11 a.m. State School, Biggenden; Coulstoun Lakes: Lantern Lecture, Public Hall, 8 p.m.

Thursday, 8th October.—Degilbo School, 2 p.m.; Lantern Lecture, Public Hall, 8 p.m.

Friday, 9th October.—Gooroolba State School: Lantern Lecture, Public Hall, 8 p.m.

Saturday, 10th October.—Byrnestown: Lantern Lecture, Public Hall, 8 p.m.

Monday, 12th October.—Ban Ban Springs: Lantern Lecture, Public Hall, 8 p.m.

Tuesday, 13th October.—Gayndah: Lantern Lecture, School of Arts, 8 p.m.

Wednesday, 14th October.—Reid's Creek School at 3 p.m.; Lantern Lecture in School, 8 p.m.

Thursday, 15th October.—Binjour Plateau School, 2.30 p.m.: give Lantern Lecture, 8 p.m.

Friday, 16th October.—Gurgeena School, 11 a.m.: Lantern Lecture, 8 p.m.

Saturday, 17th October.—Mundubbera: Lantern Lecture in Shire Hall, 8 p.m.

Monday, 19th October.—Mundubbera district: Lantern Lecture, Upper O'Bil Bil School, 8 p.m.

Tuesday, 20th October.—Eidsvold: Lantern Lecture, Shire Hall, 8 p.m.

Thursday, 22nd October.—State School, Tiaro, 11 a.m.; Lantern Lecture, Public Hall, 8 p.m.

Friday, 23rd October.—Gundiah: address farmers, Public Hall, 11 a.m.; Gundiah School, 2 p.m.; Munna Creek: Lantern Lecture, Public Hall, 8 p.m.

Saturday, 24th October.—Return to Brisbane.

Further particulars in connection with this itinerary may be obtained from the Department of Agriculture and Stock, Brisbane, from Mr. J. Bourke, District Organiser for Local Producers' Associations at Biggenden, and from members of District Council in the districts to be visited.

Staff Changes and Appointments.

Mr. D. McDonald has been appointed Canegrowers' Representative on the Moreton Local Sugar Cane Prices Board, *vice* Mr. D. F. Story, resigned.

Mr. C. B. Buxton, Clerk of Petty Sessions, Mackay, has been appointed Chairman of the Local Boards at Cattle Creek, North Eton, and Racecourse Mills, as from the 17th September, 1925; and Mr. M. Gallagher, Police Magistrate, Mackay, has been appointed Chairman of the Farleigh, Marian, Plane Creek, and Pleystowe Mills' Local Boards, as from the 17th September, 1925, *vice* Mr. F. J. Cherry, Police Magistrate, resigned and transferred from Mackay.

Peanut Board.

An Order in Council has been approved altering the constitution of the Peanut Board in order to provide for representation of the Central District on the Board. For the purposes of the Board, the State is now divided into three districts, as follows:—

District No. 1 (comprising Petty Sessions Districts of Wienholt and Nanango);

District No. 2 (comprising Petty Sessions Districts of St. Lawrence, Rockhampton, Mount Morgan, Wowan, Gladstone, Emerald, and that portion of the Clermont Petty Sessions District situated to the east of Suttor River and Mistake Creek);

District No. 3 (comprising rest of Queensland).

The members have already been elected for District No. 1 for the 1925-26 Board, but nominations are being called for election as growers' representatives for Districts Nos. 2 and 3. One representative is required for each of these districts.

Cheese Board.

The following persons have been appointed to be the Cheese Board until the 30th June, 1927:—

H. T. Anderson, Biddeston; H. Keefer, Pittsworth; D. G. O'Shea, Southbrook; A. G. Tilley, Rose Hill; M. P. Hansen, Maclagan; Representatives of the Growers; and

J. McRobert, Tiaro (Representative of Council of Agriculture).

Oranges and Health—Their Food Value.

In addition to whetting the appetite and quenching thirst, oranges have a special food value. As a matter of actual fact, no other fruit is equal to the lemon or the orange in providing so much nutritive health-giving juice. The organic salts in citrus fruits arouse the appetite and aid digestion by increasing the flow of saliva and gastric juice. They render the blood less alkaline and increase the phosphates in the red blood cells. They are anti-scorbutics, preventing scurvy and other so-called deficiency diseases. They are rich in the life-giving vitamine, so necessary for growth and health. Oranges are of special value in the treatment of anæmia and in convalescence after acute illnesses.

Oranges have established a reputation in the prevention and treatment of influenza and other catarrhal infections, due, no doubt, in a great measure to their effect in building up the general resisting power of the individual.

An interesting experiment in nutrition showing the relative value of oranges *versus* milk in the lunch of school children is recorded from America. Five groups of children, 7 per cent. or more under weight, were induced to eat the school lunch during two periods of eight weeks, and were not influenced by change of home diet. Group 1 was given half a pint of milk and two "crackers." Group 2 was given an orange of medium size and two "crackers." Group 3 was given half a pint of milk and one orange of medium size. Group 4 was given quarter of a pint of orangeade and two "crackers." Group 5 (the control group) was given nothing. The economic status of the homes permitted adequate food in the home.

That a mid-morning lunch was of value in improving underweight children was demonstrated. The supplementary lunch of one orange and two "crackers," as measured by gain in weight, gave better results than milk and orange or milk alone. The percentage in weight gained of all the groups was greater than that made by the controls. The conclusion was that milk, while producing favourable increase in weight, is not the only food valuable for the mid-morning lunch; and that concentrated bottled orange juice appears to be of marked value in stimulating growth in the underweight child, though not equal in value to fresh oranges.

29

A Reported New Weevil Killer.

A report of a new weevil-killer, said to be safe and 100 per cent. effective in use, which was reprinted from an American paper by an important Queensland newspaper, created interest in the Department and, in view of its importance to the grain grower, further information on the subject was immediately sought. A letter addressed to the United States Department of Agriculture brought a courteous reply from which we quote:—

"The fumigant to which you refer was developed by this Bureau in co-operation with the Bureau of Chemistry. It is made up of a mixture of forty parts of ethyl acetate and sixty parts of carbon tetrachloride. The resulting mixture is similar in nature to carbon disulphid and is used in exactly the same manner. It is recommended by this Department for fumigating thrashed grain in railway box cars or elevator bins. It is not quite as effective as carbon disulphid, but has the advantage of being non-explosive and non-inflammable under ordinary conditions. It has the disadvantage of leaving a distinct odour on fumigated grain. This odour, however, is not carried over into the by-products and does not affect the baking quality of wheat. It is necessary to use this fumigant at the rate of from 40 to 50 lb. per thousand cubic feet of space. The necessity of using such a large amount of the material is one objection to its use in fumigating railway cars of grain. Where carbon disulphid can be safely used, you will find it superior to the new fumigant. The chemicals, ethyl acetate and carbon tetrachloride, may be purchased separately and mixed as desired, or the fumigant may be purchased already mixed."

The Department has since been advised by the manufacturers of the fumigant as follows:—

"Your request to the Department of Agriculture in Washington has been referred to this company. We did manufacture a mixture of ethyl acetate and carbon terachloride, and while it was a very good grain fumigant, we found that the ethyl acetate combined with the oils of the sour wheat and left an odour with the wheat which took a great deal of trouble to eliminate, and in some cases it was not eliminated entirely.

"In view of this, we have discontinued the manufacture and sale of this product. We have no agency in Australia."

How America Does It.

According to the Department of Markets and Migration, Melbourne, arrangements are already well in hand in the United States for the observance of Canned Foods Week in November. This observance is carried out annually and is designed to educate the nation as to the value of canned goods and to popularise their sale. The arrangements for the conduct of the campaign are under the control of a central committee representing canners, brokers, wholesale grocers, retail grocers, and others interested in promoting the sale of canned foods. Local committees will be organised, and they will consist of local grocers and others interested. Seven hundred thousand posters will announce the event. Three hundred thousand of these are suitable for window decoration, and it is intended to make use of one thousand large posters in the subways of New York city and environs alone. Sixty thousand large muslin streamers will be provided for motor trucks and delivery wagons. It is hoped to arrange a demonstration in at least every city in the United States of 10,000 population or over. "Stock Your Pantry," "Rich in Vitamines," and "If it's Canned it's Fresh," are to be the official slogans of the campaign. The California Packing Corporation also intends a new campaign to sell its well known "Del Monte" products, and states that it will deliver over 165,000,000 separate advertising messages—a steady, continuous drive to create sales.

Advertising Citrus Fruits.

According to the Department of Markets and Migration, Melbourne, the California Fruit Growers' Exchange, Los Angeles, had available, in round figures, 900,000 dollars for advertising of the 1923-24 citrus crop. Because of the increased production of citrus fruits in California and Florida, and because of the large fraction of the California orange crop which was undersize, due to unfavourable weather, it was believed necessary to make unusual merchandising inducements. It was important to increase the unit of sale. Oranges in many districts were sold by the peck, and special sales with special prices on odd quantities were conducted. As lemon shipments were 53 per cent. in excess of the preceding year, intensive sales methods had to be employed to dispose of the fruit in the hands of the exchange. An increased quantity of citrus fruit was exported to Honolulu and the Orient, and the shipments to the United Kingdom were three times those of any recent year.

Advertising assessments have been increasing since 1919, as will be noted by the following table:—

Year.	Oranges and Grape Fruit.	Lemons.	Approximate Assessment.
	Cents per Box.	Cents per Box.	Dollars.
1916	2·5	4·0	335,000
1917	2·25	4·0	395,000
1918	2·0	4·0	215,000
1919	2·5	4·0	425,000
1920	2·5	6·0	515,000
1921	3·5	6·0	780,000
1922	3·5	6·0	490,000
1923	4·0	6·5	790,000
1924	4·5	7·0	900,000

The advertising campaign included 53,000,000 copies of full colour-pages in magazines with national circulation, and 175,000,000 insertions in daily newspapers in the United States and Canada. In addition, farm papers were used; also, trade papers, posters, window displays, and special news articles in newspapers and magazines. More than a million especially prepared bulletins for classroom instruction were supplied to schools. The support and co-operation of 3,000 jobbers and 400,000 retailers who handle oranges and lemons were enlisted. During the year the exchange's seventeen service men "personally visited 44,000 retail stores, and, in addition to giving advice and suggestions on fruit sales, placed in store windows 225,000 pieces on Sunkist and Red Ball display material."

Empire Cotton Futures.

According to the "Times Trade Supplement" considerable satisfaction will be felt in Empire cotton circles at the announcement made recently by the Liverpool Cotton Association that it has agreed to adopt a new form of "futures" contract, officially styled "The Empire and Miscellaneous Cotton Delivery Contract." Thus the marketing of Empire cotton will in future enjoy the same facilities as American, and the producers will benefit by the removal of the disadvantages resulting from the fact that banks as a rule will give much larger advances on cotton which can be bought and sold in the freedom of a "futures market." The new facilities will also tend to enhance the popularity of Empire cotton amongst spinners and manufacturers, for, as the President of the Liverpool Association has pointed out, they will provide cotton users with the means of obtaining the necessary safeguards against the risk of price fluctuations. The association hopes that the fact that a "hedge" in the futures market is now provided for growers, and importers of Empire cotton will greatly benefit Empire cotton-growing.

Boosting the Hawaiian Pine—A Tip for Queensland Growers.

According to the Commonwealth Department of Markets and Migration, the Association of Hawaiian Pineapple Canners, San Francisco, is planning a campaign to increase sales. This is to continue unabated throughout the year. Every variety of pineapple is to be featured, and artistically coloured illustrations of dishes in which pineapple may be used are to be widely distributed. One hundred and twenty million separate advertising messages are to be delivered, and these will cover every town and hamlet in the United States.

Answers to Correspondents.

Berk-Tamworth Cross.

H.C. (Manyung)—

The Berkshire-Tamworth cross is regarded as excellent for the purpose of bacon production, and you cannot go wrong in keeping to this type. Mr. Shelton recommends the use of a Berkshire boar crossed on to Tamworth sows, or, in the event of good first cross sows being available, to mate them to an unrelated Berkshire boar; but on the other hand, the Tamworth boar can be used to much advantage if good type Berkshire or Berkshire grade sows are available.

Sick Sow.

J.S. (Comboyne, N.S.W.)—

The Instructor in Pig Raising (M. E. J. Shelton) advises:—

It is apparent that the sow had previously developed a very heavy cold, which, being neglected, developed into pneumonia, which is very difficult to treat. Give several 2 oz. doses of epsom salts in food—doses, say, on Monday, Wednesday, and Friday, of each week, for two weeks. This should tend also to relieve gastric trouble and to improve appetite. Give plenty of clean drinking water, and green lucerne, &c., and compel regular exercise. With care and attention there is no reason why she should not recover.

When making new purchases, isolate them for a period of three weeks before allowing them to mix with your other pigs. In this instance it certainly looks as if the disease has been introduced into the herd by your newly-purchased boar. Sick pigs should be immediately isolated and receive special treatment and attention. Your district Stock Inspector would probably assist you with information and advice. We shall be pleased to hear further from you at a later date. There is something wrong either in the system of feeding or of housing. Why not have your district Stock Inspector investigate the matter for you?

Pneumonia in Pigs.

R.F. (Scone, N.S.W.)—

The Instructor in Pig Raising (Mr. E. J. Shelton) advises:—

At first sight it appears that your pigs have been suffering from a form of contagious pneumonia, probably brought on as a result of continuous wet and cold weather experienced in recent months. Feeding is evidently at fault also, for it would appear that your pigs have suffered also from constipation, the result of consuming too much indigestible fibrous matter. Pigs coming from the stud you name would have been accustomed to being fed on soft, succulent, nourishing foods, such as the refuse from the dining-rooms and kitchen, and waste leaves from vegetable garden, and to concentrated meals such as barley meal and pollard, and it is evident that the change of food and environment has upset the animals since arriving at your farm. You may be overfeeding. Pigs suffer from digestive disorders just the same as human beings, and indigestion and gastric troubles predispose animals to a variety of diseases.

"Currant Bush" *(Leptomeria acida).*

E.R. (Dunwich)—

The Government Botanist (Mr. C. T. White, F.L.S.) advises:—

The specimen forwarded by you with the wild flowers for the Gardens was *Leptomeria acida*, commonly known as "Wild Currants" or "Currant Bush." It is a fairly common shrub along the islands off the coast, particularly Stradbroke Island in Moreton Bay and Fraser Island in Wide Bay. The fruits are eaten raw, but it is not thought they would be of any use for culinary purposes. A peculiarity of the plant is that the finer underground roots attach themselves to the roots of other plants, from which they absorb water and possibly a certain amount of plant food in solution.

Canadian Wonder Beans as Pig Food.

A.H. (Radford)—

It is doubted if you will find any reference to these beans in any list of recommended pig foods. This is not because they are of no value as a pig food, but because commercially they are invariably more valuable for domestic purposes. Of crops of a similar nature Mr. Shelton recommends field peas, sown in conjunction with skinless barley or feed oats or even wheat or cowpeas. Field peas have the advantage that they make ideal green food when the pods have fully formed, the vines being eaten greedily by pigs of all ages. That is not the case with cowpeas, for this plant is of much coarser growth, and the stalk and leaves are comparatively tough and fibrous, and pigs are by no means keen on them, but the pea pods are relished highly, especially when the pods have ripened. The peas also make splendid food for use in combination with maize or other cereals.

Farm and Garden Notes for November.

FIELD.—Farmers are commencing to realise that quick-maturing wheats which possess a degree of rust resistance are more dependable than the slow-growing and often rust-susceptible kinds, which are gradually giving place to these and mid-season varieties.

Growers are advised to make every preparation to work up the surface of the ground immediately after the removal of their crops, so that the soil may be put into good condition to receive any rain which falls, the conservation of which is the best guarantee for the success of the next succeeding crop. Such initial preparation also encourages the early growth of all foreign and weed seeds, and permits of their eradication by the implements used to produce the desired soil mulch. In such manner paddocks are kept clean and the purity of crops is maintained. The careful preparation of areas intended for maize-planting cannot be too strongly impressed upon growers. Deep and thorough ploughing, followed by cross-ploughing and subsequent cultivation of the soil, must precede sowing if success would be attained; and all efforts must be concentrated to obtain a good surface mulch. Failure to follow up the subsequent sowings by harrowing prior to the appearance of the young plant conduces to weed growths and very often entails, by neglect of this operation, subsequent hand-hoeing between the plants in the drills. Harrowing should be discontinued before the plant breaks through the surface, otherwise damage will accrue to the tender shoots of the young plants. When the young maize plant has hardened up it may, with advantage, be lightly harrowed in the direction of the drills, but such practice must discontinue once the plant has attained a height of 6 inches. Close cultivation by inter-row cultivation implements is necessary after every shower to conserve moisture and to prevent weed growth, care being taken to ensure each cultivation being shallower than the preceding one, and so prevent damage to the root system of the plant, which is extensive. Inter-row cultivation should cease with the advent of the cob on the plant; and, if proper attention has been given to the crop, it should, at this period, be unnecessary. Where crops are planted on the check-row principle, inter-row cultivation is facilitated, and more even crops result.

The French millets (red and white), owing to their rapid maturing qualities, form excellent intermediate or supplementary crops, and are suitable for present sowing. Their value for fodder and seed purposes is worthy of more general recognition at the hands of the average farmer.

Past dry periods have impressed upon us the necessity of providing during good seasons against the return of less favourable ones, and in this connection the cultivation of quick-growth fodder plants appeals to us. Many varieties of useful classes of fodder can be cultivated over a large portion of this State; chief of which, perhaps, are the sorghum family for grain and fodder purposes. Of the latter, Sudan grass has much to commend it, and is fast becoming one of the most favoured by stockowners. Grain sorghums, of which Feterita, Red Kafir, and the various Milos are examples, should occupy a more prominent position for purposes of horse and pig feeding, and are particularly suited to those localities which are unsuitable for maize production. Some varieties of sorghum have strong frost-resisting qualities, and lend themselves to those localities where provision for some form of succulent fodder is necessary during the winter months.

Orchard Notes for November.

THE COASTAL DISTRICTS.

November is somewhat of a slack month for fruit in the coastal districts, as the citrus crop, excepting a few Valencia Late oranges, off-season lemons, and a few limes, is over. Pineapples are also scarce, as the late spring crop is finished, and there are only comparatively few off-season fruits ripening. The main summer crop of fruit in the principal producing districts is only in the flowering stage, though that in the more tropical parts is ready for marketing. It is also a slack month for

bananas, as the summer fruit is not yet fully developed, and the bunches that make their appearance are usually poor. They have been slow in developing on account of the comparatively cool weather of winter and early spring, when the suckers were more or less at a standstill. Young suckers should, however, be making vigorous growth now, and the plantation will require constant attention to prevent the stools being overcrowded with too many suckers. Keep the land well worked and free from weeds of all kinds, as good growth now means good bunches in the autumn and early winter. Where there is a danger of the soil washing badly with heavy rain, rows of Mauritius, velvet, or other suitable beans should be planted at right angles to the fall of the land, as the growth they make will tend to hold the soil and thus save any from being washed away. When planting beans of any kind, either to prevent washing or for green manuring, don't forget to manure them, as thereby you will get a much greater yield, and as none of the manure is removed from the soil, as the crop is allowed to lie and rot on the ground, it is all made use of eventually by the permanent crop.

A good all-round manure for a bean crop is a mixture of 1 cwt. of sulphate of potash and 4 cwt. of basic superphosphate or finely-ground phosphatic rock to the acre, and, if the soil is deficient in lime, a dressing of not less than half a ton to the acre will be found very beneficial, as all leguminous plants require lime to yield their maximum return both of haulm and pulse. The pineapple plantations require to be kept in a state of thorough tilth, and no weeds must on any account be allowed to grow. If blady grass makes its appearance it must be stamped out, as once it gets established in the rows it is only a short time before it takes control, and the plantation is ruined, so that it can only be brought back into profit by taking out the pines, killing the blady grass, and, after thoroughly and deeply working the land, manuring it and replanting.

The planting of pineapples and bananas can be continued throughout the month, taking care to see that the land is properly prepared and that the advice given in previous monthly notes is followed. Young pawpaw plants that have been raised in the seed bed can be set out now, as also can young passion fruit. Citrus orchards require to be well looked after; the ground must be kept in a state of thorough tilth, and if the trees show the slightest sign of distress, owing to lack of moisture in the soil, they must be given a thorough irrigation if water is available for this purpose. The trees should be carefully examined from time to time so as to note when young scale insects of any kind are hatching out, and when this is noted they should be sprayed with a weak emulsion of a miscible oil consisting of one part of oil in forty parts of emulsion, as this is quite strong enough to kill any young scales before they develop their protective covering. As stated in these notes previously, no oil sprays should be used when the trees are suffering from lack of moisture, as they are then likely to do more damage than good to citrus trees. If scale insects are very bad, and it is important that the trees are sprayed, a weak lime-sulphur spray, or even a soap and tobacco or weak resin wash, will kill the young scales as they hatch out. In the earlier districts a keen lookout must be kept for the first appearance of the mites, which are the direct cause of the darkening of the skin of the fruit known as "Maori." The first indication of the trouble is that when the sun is shining on the young fruit, it appears to be covered with a grey dust, and if the fruit is examined with a good lens it will be seen to be covered with large numbers of small yellowish slug-like insects which are living on the skin. Spraying with sodium or potassium sulphide washes, as recommended by the Department, or with a weak solution of lime sulphur, will destroy these insects and prevent the fruit from turning black. Borers of all kinds should be looked for and destroyed wherever found. Water sprouts, if not already removed, should be cut away. Vines will require careful attention, and the vineyard should be kept in a state of thorough cultivation. Spraying for downy mildew and black spot should be continued, if necessary, as well as sulphuring to prevent oidium.

Fruit fly must be systematically fought whenever seen, and special care must be taken to gather and destroy any early ripening peaches or other fruit that may be infested. If this is done systematically by all growers, as provided by the Diseases in Plants Act, there will be many less flies to attack the later crops of mangoes and other fruits.

Leaf-eating insects of all kinds should be systematically fought wherever seen, by spraying with arsenate of lead, and potatoes and tomatoes should be sprayed with a combined spray consisting of Bordeaux or Burgundy mixture and arsenate of lead, so that diseases such as early blight and Irish blight may be prevented and leaf-eating insects, which frequently cause very heavy losses to these crops, be destroyed.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Keep the orchards and vineyards in a thorough state of cultivation, so as to keep down all weed growth and conserve moisture in the soil. This is important, as, if a long spell of dry weather sets in, the crop of summer fruit will suffer severely from the lack of moisture. Citrus trees should be irrigated where necessary, and the land kept in a state of perfect tilth. Spraying for codlin moth should be continued, and all pip fruit trees must be bandaged the beginning of the month; further, the bandages must be examined at frequent intervals and all larvæ contained in them destroyed. The neglect to spray thoroughly and to attend to the bandages properly is responsible for the increase in this serious pest in the Granite Belt, and growers are warned that they must pay more attention to the destruction of this pest if they wish to grow pip fruit profitably. Fruit fly may make its appearance in the cherry crop; if so, every effort should be made to stamp out the infestation at once, as, unless this is done, and if the fly is allowed to breed unchecked, the later ripening crops of plums, peaches, apples, pears, apricots, and Japanese plums are bound to become more or less badly infested. Combined action must be taken to combat this, the most serious pest of the Granite Belt, and growers must realise that, unless they take this action and see that careless growers do not breed the fly wholesale, they will never keep it in check, and it will always be a very heavy tax on their industry. Rutherglen bug is another serious pest in this district, and is propagated by the million by careless orchardists. The best remedy for this pest is to keep the orchard clean and free from weeds. Brown rot in fruit should be watched for carefully, and, on its first appearance in a district, all ripening fruit should be sprayed with the sodium sulphide wash.

All kinds of leaf-eating insects should be kept in check by spraying with arsenate of lead, and all grape vines, potatoes, and tomatoes should be kept sprayed with Bordeaux or Burgundy mixture, the former for black spot and downy mildew, and the latter for early and late (Irish) blight.

Photo.: O. A. Jones.]

Cloud Shadows on the Upper Brisbane.

Plate 115.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S., and A. K. CHAPMAN.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

1925.	September.		October.		Moonrise. Sept.	Moonrise. Oct.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	6·7	5·37	5·33	5·51	3·51	4·49
2	6·6	5·38	5·32	5·52	4 58	5·52
3	6 5	5·38	5·31	5·52	6·4	6·51
4	6·4	5·39	5 30	5·53	7 8	7·52
5	6·3	5·39	5·29	5·53	8·10	8·49
6	6·2	5·40	5·28	5·54	9 9	9·46
7	6·1	5·40	5 27	5·54	10·8	10·42
8	6·0	5·41	5·25	5·55	11·4	11·35
9	5·58	5·41	5 24	5·55	11·59	nil
						a.m.
10	5·57	5·41	5·23	5·56	nil	12·24
					a.m.	
11	5·56	5·42	5·22	5·56	12·52	1·12
12	5 55	5·42	5·21	5·57	1·43	1·55
13	5·54	5·43	5·20	5·57	2·31	2·34
14	5·53	5 43	5·19	5·58	3·17	3 13
15	5·52	5·44	5·18	5·58	3·59	3 49
16	5 50	5 44	5·17	5·59	4·38	4·26
17	5·49	5·45	5·16	6·0	5·15	5·0
18	5·48	5·45	5 15	6·0	5·50	5 35
19	5·47	5·46	5·14	6·1	6·26	6·15
20	5·46	5·46	5·13	6·1	7·1	6 55
21	5·45	5·46	5·12	6·2	7·38	7·40
22	5·44	5·47	5·11	6 2	8·15	8·29
23	5·42	5·47	5·10	6·3	8·57	9·26
24	5·41	5·48	5·9	6·4	9·43	10·23
25	5·40	5·48	5·8	6·4	10·34	11·27
						p.m.
26	5·39	5·49	5·8	6·5	11·30	12 29
					p.m.	
27	5·38	5 49	5·7	6·6	12·31	1·32
28	5 37	5·50	5 6	6·6	1·34	2·35
29	5·36	5·50	5 5	6·7	2·39	3·38
30	5·34	5·51	5·4	6 8	3·45	4·37
31	...	...	5·3	6·9	..	5·36

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

3 Sept.	○ Full Moon	5 53 a.m.
10 ,,	☾ Last Quarter	10 12 a.m.
18 ,,	● New Moon	2 12 p.m.
25 ,,	☽ First Quarter	9 51 p.m.

Perigee, 1st Sept. at 3 54 p.m.
Apogee, 13th ,, at 5 12 p.m.
Perigee, 29th ,, at 2 48 p.m.

On the 11th September Mercury will be at its greatest distance (about 18 degrees) west of the Sun, rising 44 minutes before the latter. Mars being in conjunction with the Sun on the 13th instant will not be observable during this month. On the 21st, at 3·44 p.m., Venus will apparently be at a distance equal to that of the length of the Southern Cross southwards of the Moon. This should form an interesting daylight spectacle, especially with the aid of a pair of binoculars; good eyes should, however, detect both objects without very much difficulty. Another interesting daylight spectacle will be afforded by Jupiter and the Moon on the 26th, between 5 and 6 p.m., when Jupiter may also be seen a little southward of the Moon without binoculars by persons of keen eyesight. About 8 o'clock on the same evening an occultation by the Moon of a third magnitude star in Saggitarius will occur in Queensland, but not as far South as Sydney.

2 Oct.	○ Full Moon	3 23 p.m.
10 ,,	☽ Last Quarter	4 34 a.m.
18 ,,	● New Moon	4 6 a.m.
25 ,,	☾ First Quarter	4 38 a.m.

Apogee, 11th October at 11 12 a.m.
Perigee, 25th ,, at 10 24 p.m.

On 7th October Mercury will be in conjunction with the sun on the far side of its orbit and invisible until toward the end of the month. On the same day Jupiter will be in quadrature with the sun, and would therefore rise at midday were it not for its greater southern declination making it do so three-quarters of an hour earlier. As the planet Mercury will be in conjunction with the moon on the 18th, Saturn on the 19th, Venus on the 21st, and Jupiter on the 23rd it will be seen that these four planets will extend eastwards at no great distance from one another. Mercury will be apparently in the constellation Virgo, Saturn in Libra, Venus in Scorpio, and Jupiter in Sagittarius. These four planets will follow the sun down to the western horizon in the order shown, and with the exception of Mercury, which will be too near the sun to be visible, will form an interesting spectacle soon after sunset.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

A Cross in this space is a reminder that your Subscription to the Journal expires with this number.

ANNUAL RATES OF SUBSCRIPTION.
Farmers, Graziers, Horticulturists, and Schools of Art FREE on prepayment of 1/- to cover postage. Members of Agricultural Societies, 5/-, including postage. General Public, 10/- including postage.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXIV. 1 NOVEMBER, 1925. PART 5.

Event and Comment.

The Current Issue.

The cause of "bunchy top" in bananas has been definitely fixed by an investigatory committee which, in a very valuable report published in extenso, suggests preliminary measures for combating this disease. Agriculture in Queensland is reviewed by Mr. Quodling, who also has a note on the process of pickling wheat with carbonate of copper. Mr. Shelton discusses further phases of pig marketing in the State. A valuable paper on soil acidity is contributed by Mr. von Steiglitz, while Mr. Brünnich supplies practical "fertiliser don'ts" for farmers. Methods of destroying insect and fungus pests are compared by Mr. Benson. Wheat crop prospects and the world's cotton position are reviewed. A short preliminary note on goats is another useful feature. The Clydesdale horse is interestingly treated by Mr. Hunter. A short note on Queensland trees by Mr. White and Mr. Francis is among the most valuable of regular Journal features. Among very useful reprints are notes on the profitable feeding of iodine to swine, the science of cookery, and fallowing—the basis of good farming. In addition is much practical and seasonable information on other matters in which readers are especially concerned.

Fruit Marketing.

Any effort to deal effectively with the organisation of fruit marketing is beset, as experience has shown, with many difficulties. A perishable product, fruit presents selling problems quite different from those of other soil products. With a view to improving the conditions of the industry by widening the scope of the Committee of Direction, the Minister for Agriculture and Stock (Hon. W. Forgan Smith) submitted to Parliament last month an amending measure which set out some important new principles, the chief of which was the extension of the power of the Committee beyond

the limits laid down by the High Court of Australia as defined in the principal Act. The amending Act also gives the Committee greater powers in the direction of arranging financial accommodation and other necessary functional activities. A very important clause enables any thirty fruitgrowers affected by any direction of the Committee to demand a poll before that direction shall have legislative or legal effect. Upon a poll being demanded it must be held and a two-thirds majority of those entitled to vote must be obtained before the direction in question can become legally effective. The sound principle is laid down that the person most concerned—the grower—shall have the final say as to whether compulsion may be exercised at the discretion of the Committee in respect to the marketing, or handling otherwise, of a particular commodity or not. Another important clause covers the conferring of property in a commodity. Under this provision the Committee of Direction may take the initiative. Where it is proposed to acquire property in a commodity, powers are given similar to those contained in the Primary Products Pools Act. First of all, a direction must be given by the Committee, and that must be approved by a vote under the conditions to which reference has been made. After that is done, if for any purpose property is desired in a commodity, the Committee must apply to the Minister for an Order in Council granting powers of acquisition. If an Order is issued, then that will be subject to the vote of the growers on exactly the same terms and under the same conditions as are provided in the Primary Products Pools Act. The amending measure should prove satisfactory to all sections of the fruitgrowing industry for, in these days, there are very few who do not believe in regulated, scientific marketing. It will establish conjointly with the principal Act a fruit marketing organisation which, if used with common sense and discretion, will do much to improve conditions in the industry, and encourage those engaged in a calling which is of vital importance to the State.

The Wheat Pool.

Last month the Minister (Hon. W. Forgan Smith) succeeded in passing through Parliament a measure to amend the Wheat Pool Act. Under the new legislation the Wheat Pool Board is given similar powers in respect to the building of reserves, effecting its own insurance, and other special purposes approved by wheatgrowers, as those given to boards constituted under the Primary Products Pools Act. Provision is also made for growers, if desired, to come within the ambit of that Act, for it is thought that as problems of marketing are similar in nearly all forms of primary industry, the Primary Products Pools Act contains all essentials in respect to the special circumstances of any phase of farming. The conditions that formed the basis of special wheat pool legislation have now disappeared, and for convenience of administration generally, it is desired to have all pool boards in Queensland operating under the same powers, under the same conditions, and under the same Act. The Wheat Pool Act was the first of its kind introduced in Queensland, and it had its genesis to a certain extent as a result of the Federal pool which was established in 1917. Queensland was not given any representation upon that pool. Later on a deputation of wheat farmers was introduced by the then leader of the Opposition asking the Government to introduce a Wheat Pool Bill in this State and to confer certain powers upon it. The Government fully considered the matter, with the result that the Wheat Pool Act was passed for a specific period; but power was taken under the Act by Order in Council to extend the operations of the Act from time to time as circumstances or public policy demanded. From then till the present day the wheat pool has been continued as a result of votes taken among the wheatgrowers themselves. On the last occasion something approaching 90 per cent. of the wheat farmers who voted decided for a continuation of the pool.

It may be fairly claimed that one result of this form of regulated marketing is that wheat cultivation has been extended in Queensland. In 1915, for example, the area under crop was 93,703 acres; in 1920 it had increased to 177,320 acres; and in 1924 it had again increased to 189,145 acres; so that it will be seen that the administration of a measure of this kind, which provides facilities for marketing by the growers concerned, has resulted in increased cropping. Growers under the pool will have the opportunity, if they so desire, to take a vote as to whether they shall come under the Primary Products Pools Act or not. If the vote results in an affirmative vote of at least two-thirds of those taking part in the poll, then the wheat pool will be brought under the Primary Products Pools Acts, all its assets and liabilities being continued under the new board. In other words, there will be a continuity of operations by the board, and no gap or interruption will take place in the general control of its business. If growers decide not to come under the Primary Products Pools Act but desire to remain under their own Act with all the powers that are contained therein, that is, of course, their own business. No one could be averse from that decision if made, and the old Act will continue as at present with the addition of the provisions of the amending measure under review.

Cotton Seed Beds—Value of Early Preparation.

Emphasis was laid by the Cotton Specialist (Mr. W. G. Wells) in a recent Press statement on the value of the early preparation of seed beds in the cultivation of cotton which he made following an inspection of the Callide Research Station located at Biloela. An excellent demonstration of the value of the early preparation of the seed bed was observed at the research station in a series of plots which had grown cotton last season. The last season's crop on these plots was ploughed out, raked up, and burned in the latter part of June, when there was a fair sprinkling of unopened and opened bolls showing in the tops of the plants and on the fruiting branches of the large vegetative branches. It was decided at the time that while the light top crop of bolls might contain cotton of some value, the early ploughing of the soil and the early preparation of the seed bed would more than compensate for the small loss incurred by the destruction of the crop. This plot received one good ploughing of a depth of 7 in. in the last week of June following a rainfall of 270 points on the 19th, and 78 points on the 20th, a total of 348 points. This rain was badly needed, as the soil had been so dry as to prohibit a good ploughing being made. The plots were disced and harrowed following the ploughing. The rainfall after these operations was as follows:—4th July, 25 points; 11th July, 58 points; 28th July, 13 points; 29th August, 29 points; 30th August, 10 points; 16th September, 137 points; 17th September, 52 points; total, 3.24 in.

The plots were harrowed thoroughly after each precipitation of any note, so that by the time of planting, which occurred on 22nd September, a well-settled, springy seed bed had been prepared. A good strike was obtained, and cultivation was effected as soon as the rows were discernible. When inspected on 27th October, the plants averaged 6 to 8 in. in height, and were standing up well under droughty conditions. An examination of the soils at the time of the inspection of the plants showed that, while the surface soils were very dry to the depth of 2 to 3 in., from that point on there was ample moisture, and the subsoils at about a depth of 7 in. were in excellent condition. In contrast to this plot was a piece of newly-cleared country which had been ploughed for the first time in August, and then cross-ploughed in September, and disced and harrowed after the rains in the middle of that month. The seed bed in this plot was of a very open nature, with little moisture to a depth of 6 in. A heavy rain would be necessary before this seed bed would have settled sufficiently to offer any assurance that a crop of cotton could withstand a drought of any degree.

The same results had been obtained by the growers in the various cotton areas of the Central Queensland district. The field officer of the Cotton Section for this district stated on 2nd November that it was pleasing now to find that these men who prepared their seed bed early had been rewarded with a good strike of cotton. Although the last fall of rain of any consequence was on 14th September, the moisture conserved in the early prepared fields had been sufficient to maintain a healthy growth in the young plant, and the subsoil in these fields is still thoroughly moist. On the later prepared fields the stands were not so satisfactory, and the plants were droughty and unthrifty.

Mr. Wells pointed out that some criticisms of the quality of the seed supplied to the growers this season were met with, but undoubtedly most of the trouble experienced on this point this season had been from planting too deeply in the cold seed beds. Under the cold night temperatures of this spring, it was very necessary to plant at a shallow depth, especially if the surface soils were well moistened, as the soil temperature had risen so slowly that much of the seed had rotted if planted at a greater depth than 2 in.

It had been brought to attention that some of the growers in the Southern and inland districts of a higher altitude were contemplating abandoning planting cotton this season owing to the lateness of the rains. It was pointed out that there had been no definite tests made in these areas as to what results might be obtained from November plantings. Results obtained last season at the Monal Creek Farm in the Upper Burnett, where 7.2 deg. of frosts were received on 21st April, indicated that profitable yields might be expected from November-planted Durango cotton when 1,120 lb. of seed cotton were obtained in a time of planting experiment.

It was admitted that early planting was preferable, as much heavier yields might be obtained, but it was considered advisable for the growers to test out the Durango variety on their own soils, if only with a small test plot, before definitely deciding against November planting.

BUNCHY TOP IN BANANAS.

CAUSE AND NATURE OF DISEASE.

REPORT OF INVESTIGATION COMMITTEE.

The Bunchy Top Control Board, consisting of Sir George Knibbs (representing the Commonwealth Government), Mr. G. Valder (Under Secretary for Agriculture, New South Wales), and Mr. E. Graham (Under Secretary for Agriculture and Stock, Queensland) has received from the Supervisor of the Bunchy Top Investigation (Dr. Goddard) this valuable Report dealing with Bunchy Top disease. The Investigation Committee consisting of Professor E. J. Goddard, D.Sc., M.A. (Supervisor), Mr. C. J. P. Magee, B.Sc. Agr., Assistant Plant Pathologist), and Mr. H. Collard (Horticulturist), considers that the time has now arrived when, in the interests of banana-growers, a definite statement should be made as to the cause of Bunchy Top disease in bananas, and at least preliminary suggestions put forward as to the means of combating the disease. The subject of report, as widely recognised, is one of first importance to the industry, and the results of the investigation as set out hereunder will be welcomed by banana-growers throughout the State.

CAUSE AND NATURE OF DISEASE.

It has been definitely proved that Bunchy Top in bananas is a disease transmitted by the common dark banana aphid—*Pentalonia nigronervosa.* The intimate association of these insects with the disease was proved by observational and experimental work as early as January and February of the present year, but it was considered not to be in the interest of the investigation or of the banana-grower that any official statement should be made earlier than at the present time. It is very easy to form opinions as to the nature of such a disease, but the scientific investigator concerned with such a disease as Bunchy Top, on which much effort has been expended in various parts of the world, must prove his statements to the hilt, and any official communication should be as complete as possible. The preliminary evidence of the experimental transmission of the disease by means of aphides was obtained in January and February of this year at the Laboratory, Tweed Heads, and at the Queensland University, but it was necessary that these experiments should be confirmed under glasshouse conditions—which were available only in April, 1925. Growth of the plants under winter conditions had delayed the suitable time for experiments, but now the final proof is available. The evidence in support of this statement is briefly as follows:—Forty healthy plants from Bribie Island, free from any insects, were planted in tubs in the glasshouse—twenty in each half of the glasshouse, which is divided by a wall into two insect-proof sections. In the case of one set of twenty plants aphides from affected plants were transferred to the individual plants, and of these every plant has now developed the symptoms of Bunchy Top within a period of less than one month since the transference of the aphides. It is noteworthy that not one of the other set of twenty plants has developed any signs of Bunchy Top. This final proof of the transmission of the disease has become available only during the past week.

The foregoing remarks should serve alone to justify the delay in the official publication of the discoveries made by the investigation. These results, we are aware, have become more or less known unofficially throughout the affected area, but there are further very definite reasons why no official blessing has been given to statements which have made their way into the Press. It is one of the main objects of such an investigation to proceed further even than elucidating that a certain insect transmits the disease, and to elaborate some means of controlling the disease. In facing such a problem we have been concerned with determining whether the disease can be

transmitted by any other insect, and whether the disease can be transmitted from banana plants to other species of plants, such as hemp, canna, &c., by aphides or other insects. All these facts have a bearing on the possible methods of control of the disease.

A Virus Disease.

The evidence now available justifies us in regarding the disease as a virus disease transmitted, at least, by the dark banana aphis—*Pentalonia nigronervosa.* In some virus diseases there is a marked effect in the phloem—that part of the plant which serves for the transference of food material from the leaves to other parts of the plant. Detailed examination of this part of plants affected with Bunchy Top, as well as of associated tissues, has revealed a most interesting and unique pathological condition, the details of which will be of much interest to the scientific world when they have been described in scientific language. It is unnecessary to discuss these changes at this stage beyond stating that the representatives of vessels known as sieve tubes, serving normally for the transportation of food material, have undergone a peculiar alteration in certain regions of the phloem of the leaves of affected plants. This condition has bearing in some interesting way on the broken green streaks so characteristic of affected plants, and serving for the early detection of the disease. Perhaps the most significant aspect of these conditions in the phloem is the corroborative evidence they lend to the interpretation that Bunchy Top is a virus disease—that is, a disease due to an ultra-microscopic organism.

We have definite evidence that Bunchy Top is transmitted by the banana aphis—*Pentalonia nigronervosa.* As this species of aphis is widespread in banana plantations of Northern Queensland, where as yet no Bunchy Top has been reported, there is reason to believe that in Northern New South Wales and South-Eastern Queensland this insect is carrying some factor which induces the disease. Reasoning by analogy and taking as an instance other aphis-transmitted diseases, such as some of the degeneration diseases of the common potato, it would seem that Bunchy Top falls in the category of so-called virus diseases. This class includes those transmissible or infectious diseases which are perpetuated indefinitely by vegetative growth and reproduction, and of which no cause has yet been identified and demonstrated—except in the recent cancer investigations, where specially improvised apparatus was used. The name ''virus'' is the name given to this ''unknown'' cause. The virus, which by some pathologists is supposed to be of the nature of an ultra-microscopic organism, seems to be associated with the plant juice or sap. This class of disease can in many cases be quite readily transmitted from diseased to healthy individuals by direct inoculation of sap. In the case of other virus diseases, it is necessary that the inoculum be introduced into a particular region of the vascular system of the plant. There are some virus diseases which are transmitted only by means of aphides and by grafting, and in the case of these it has been shown that the aphis inserts the proboscis into the region of the phloem. Bunchy Top would appear to belong to this latter group.

It would be premature to conclude definitely that the disease cannot be transmitted by direct inoculation of sap, but the early out-of-doors experiments made in 1924, and more recent experiments made with sap inoculation in the glasshouse at the same time as the successful experiments with aphis-infection, have as yet failed to give results. The excessive development of chlorophyllous tissue, together with the dwarfing of the plant and rosetting of the leaves, support the idea of the virus nature of the disease. The absence of symptoms from foliage that has attained full growth before the introduction of the virus is also a characteristic of these infectious diseases. In the case of Bunchy Top plants, the first symptom of the disease is the appearance of broken dark-green streaks along the secondary veins of the leaf blade. This symptom does not later appear in leaves which were thrown earlier and had attained maturity. Further evidence is the fact that eyes removed from a rank Bunchy Top stool, surface-sterilised and planted in sterilised soil under glasshouse conditions, have in all cases produced Bunchy Top plants. Internal examination of such eyes reveals no organism, under microscopic or cultural tests, on which suspicion could lie.

Cause of Disease Definitely Established.

It should be stated that among the various theories which were previously put forward to explain the cause of Bunchy Top, there was that which postulated that aphides were the cause of the disease. This theory was put forward by Mr. J. Marks, of Terranora, in 1922, and has had some following on the part of other planters in

various parts of the affected areas. The position in this respect, when the present Investigation Committee undertook duties, was that nothing had been proved or disproved, and an open mind was displayed in respect to this and the other theories as to the cause of the disease. It can now be definitely stated that the cause of the disease is no longer a matter of opinion, and that its nature has been definitely established.

CONTROL MEASURES.

A knowledge of the nature of the disease and its mode of distribution enables us at this stage to make definite recommendations to growers in lightly affected areas; and the value of such has been to some extent attested in the field. It is to be understood, however, that there still remains ahead of the Invstigation Committee a considerable amount of work involving the elucidation of certain aspects which may have an important bearing on the matter of control. As examples of such we might refer to the necessity for a knowledge of—

(*a*) Details of the life-history of the aphides;

(*b*) Number of generations of aphides through which the virus persists;

(*c*) Liability of other plants, such as Manilla hemp, canna, arrowroot, &c., to the disease;

(*d*) Habits of the dark banana aphis in respect of other possible host plants, &c., &c.

Progress is being made in the investigation of such, but it is quite premature to attempt at this stage to lay down final recommendations applicable to the entire affected area. It is for the reason that we feel that valuable recommendations can be made for the lightly affected areas, and that certain unjustifiable semi-official statements have recently been made in the Press, that an attempt is here made to set out the exact position in the present state of our knowledge.

The disease is spread by the transference of affected suckers and by means of aphides. The carriage of the disease to new or lightly affected areas can be largely avoided by the elimination of the first method by growers, who should understand that any plantation which has ever developed the disease in any part is to be regarded as dangerous in practice. The distribution of the disease by means of aphides is facilitated by the presence of one or a few affected plants in a plantation and by the proximity of affected plantations. Winds may assist the aphides to traverse fairly wide zones, but we feel that the adoption of the following recommendations will enable growers in lightly affected areas to combat the disease by making conscientious efforts to cope with the methods of natural distribution.

Recommendations to Growers in Lightly Affected Areas.

(1) Secure suckers only from areas in which Bunchy Top has not yet been recorded. Such areas are available only in Queensland, some distance north of the Brisbane River. No reliance should be placed on any apparently healthy plants in any plantations in which Bunchy Top has ever appeared, as it may happen that the disease may be about to develop in such.

(2) Carry out at least a weekly examination of each plant in each stool, paying careful attention to the last leaf in each plant, and observing whether there is any trace of the characteristic broken dark streaks in the leaf blade. A definite day at least each each week should be set aside for this purpose.

(3) Do not plant out more suckers than can be satisfactorily dealt with in such a weekly inspection.

(4) Deal at once with any affected stool as follows:—

(*a*) Spray the whole stool thoroughly, as well as the surrounding soil, with Black Leaf 40, in order to kill any aphides present.

(*b*) Dig out the stool complete, even if only part is affected, and cut all parts of the plants into slices with a cane knife or suitable implement. (There is no necessity, nor is it advisable, to carry away such material, which can be left to die in the plantation. (A very conscientious grower might well give an additional spraying to the cut-up material.)

(5) We would most strongly dissuade growers from following the advice rendered by sellers of certain poisons, whose value, as advertised, consists in the fact that they kill off only those parts of a stool which have been treated. As in most cases most followers will develop the disease, this method is really aiding the distribution of the disease.

Success in fighting the disease lies in the earliest detection of diseased stools and their immediate destruction. It is appreciated that there is in many plantations a great difficulty in removing stools by digging-out, owing to the presence of boulders. In such cases it would be excusable to cut down the stools after spraying them, and then to poison each individual plant. For such poisoning, the butt of each individual plant could be treated with kerosene, until such time as a specific and cheap poison can be recommended by the Investigation Committee. Poisoning should not be reverted to unless digging-out is an impossibility.

(6) Growers should encourage their neighbours to follow the above procedure as diligently as themselves, since without such help every assistance is being rendered towards gradually transforming areas now lightly affected into heavily affected areas.

(7) As information is not yet available as to the number of generations of the aphides through which the virus can persist, and the aphides are to be found in abundance in the soil, growers cannot be recommended to plant suckers in holes from which affected stools have been removed. It is premature to make definite suggestions at this tage as to any effective means of treating such holes to the extent of ensuring safe planting in them.

(8) There are good cultural reasons why banana plants should be set out in rows 12 feet by 12 feet, and the adoption of this method of planting should offer at least some advantage in possibly withdrawing one means of ready distribution of aphides.

Heavily Affected Areas.

While the Investigation Committee feels that there are ready means of keeping the disease under control in lightly affected areas, the case is otherwise in heavily affected areas.

It will be appreciated that in combating Bunchy Top, two lines of attack are suggested—

(1) Removal of the source of inoculum—namely, affected plants; and

(2) Some method of dealing with the vector or carrier—namely, the aphides.

Of these two the most satisfactory would be the complete removal of the source of inoculum, and it is because this is practicable in lightly affected areas that it is possible to suggest definite recommendations as outlined above. This is not immediately practicable in the heavily affected areas, where there are so many deserted and heavily affected plantations in close proximity. This condition directs attention to the possibilities of dealing with the aphides. There are certain plantations where it is alleged that control is, at least, effected by spraying with Black Leaf 40. The Investigation Committee is not in a position to substantiate this conclusion at this stage, but final judgment on the matter should be rendered in the final report of the Investigation Committee, which should be available about the end of the present year.

A very considerable amount of time has been devoted to spraying and dusting on the experimental plots at Cobaki, but we do not look forward with great optimism to this as a practical method of control at this stage. However, final judgment is withheld for the present.

Some partial control by means of spraying would appear to be suggested in the experiments conducted by Mr. J. Marks at Terranora in 1922 with kerosene emulsion, and the experiments which are being carried out by Mr. H. Legg at Upper Burringbar with Black Leaf 40, but it cannot be emphasised too strongly that we cannot recommend this as a practical control measure in areas where the supply of virus is so readily available in deserted plantations.

While recognising that isolation may play its part, and that growers differ so much in respect of thoroughness, the Investigation Committee would at the present stage dissuade growers from planting bananas within heavily affected areas. Further discussion of this matter must be left over to the final report, as it would be premature in the present state of our knowledge to express any further opinions in this connection.

Lastly, in view of the fact that Queensland, north of the Brisbane River (with the exception of Brookfield), has so far escaped the disease, and as along the Richmond River in New South Wales there are many localities free, or practically free, from the disease, the transportation of suckers to any of these areas from the affected

zone should be effectively prohibited. Regulations in this connection do exist in Queensland, but no harm can accrue from emphasising the absolute necessity for the observance of the regulation.

Resistant Stocks—Negative Results.

It may be stated that the committee holds out little hope of any success in the attempt to secure resistant plants. A number of carefully selected plants were brought from Fiji, but most of them had to be destroyed owing to the presence of beetle borer. Eyes from some have been planted at St. Helena, but this experiment is now viewed with general interest rather than with any anticipation as to the economic possibilities. Our experience with apparently resistant plants within the affected area offers no prospects of conquering the disease along the line of resistant stock. The same criticism applies to the consideration of any variety other than the Cavendish banana.

HISTORY OF THE PRESENT INVESTIGATION.

The Investigation Committee, consisting of Professor E. J. Goddard (Supervisor), Mr. C. J. Magee, B.Sc., Agr. (Assistant Plant Pathologist), and Mr. H. Collard (Horticulturist), undertook the responsibilities of the investigation of Bunchy Top in May, 1924, on the recommendation of a commission which represented the Commonwealth Government and the New South Wales and Queensland Governments.

A considerable amount of work had previously been devoted to the problem by scientific workers in Australia as well as in Fiji—where the disease had been present for practically forty years—Philippines, Ceylon, and Egypt, but no definite cause could be proved. Certainly it had been suggested by some that the disease was caused by eel-worms—in Fiji, Philippines, Queensland, and Egypt—while various others had suggested that the causal agent was a fungus, chemical deficiency of the soil, deterioration of the banana stock, climatic factors, aphids, &c. There was no substantive evidence to strengthen the claims of these opinions, and as the ravages of the disease along the Northern Rivers of New South Wales and in South-eastern Queensland were so intense, it became clear that any attempt to solve the problem would have to be made by scientific investigators working on the spot. Only in this way would it be possible to determine the actual cause. The Investigation Committee determined to keep the question quite open and to refuse to eliminate any suggested probability or to refuse to consider any probable cause which might arise, unless conclusive evidence compelled.

Work at Tweed Heads.

A laboratory was founded at Tweed Heads, and experimental plots were leased at Cobaki from Messrs. T. Pilgrim and McAlister. The investigation work at the laboratory was attended to by Mr. C. J. Magee, and the horticultural work at the plots were under the care of Mr. H. Collard. In the interval, awaiting the planting season, Mr. Collard was sent to Fiji to gather first-hand information as to the history of the disease in those islands, its present status, and the possibility of securing resistant or immune stock.

Attempts to isolate any constant fungal or bacterial agent from the various parts of affected plants were unsuccessful, and after a period of six months, during which visits were constantly made to various parts of the affected area, noting the behaviour of plants in deserted plantations as well as the initial and early stages of infestation in other plantations, it seemed highly probable, in view of discoveries mentioned later, that the trouble would not be attributed to any such agent. Nevertheless, further work was anticipated along pathological lines, since some casual agents—*e.g.*, bacteria—are very refractory and do not readily respond to cultural experiments. The details of the pathological procedure will find their place in a complete final and scientific report.

Meanwhile the investigation was also devoting attention to the matter of nematodes or eel-worms, since these were found to be abundant in all plantations, and their presence readily indicated by the almost constant presence of galls on the roots of affected and apparently non-affected plants. Plants from Northern Queensland were planted in tanks filled with steam-sterilised soil at the laboratory, with a view to settling the possible effect of soil factors—*e.g.*, nematodes, parasitic fungi, and bacteria—in a purely preliminary manner. It soon became apparent that such experiments, if they were to be of any scientific value, would have to be carried out under such conditions of control as obtain in a properly equipped glass house. This development and the necessity for such a glass house for the purposes of other

experiments which were to be tried out, compelled the supervisor to request the erection of such a glass house; the cost of the erection of this building was considered to be insignificant for scientific purposes where the national loss due to the disease was so great.

The investigation had for some time been desirous of enclosing plants in muslin or cheese-cloth nets, with a view to conducting preliminary experiments as to the transmission of the disease by insects to healthy plants grown in sterilised soil, but there was reason to believe that for out-door work in this area such nets would not be successful on account of violent winds. Such experimental work was delayed largely by the determination to postpone the same at that stage until a glass house was available.

Keeping in view the possibility that the disease might be of the Mosaic type of virus disease, attempts were made to produce the disease in healthy plants from Northern Queensland grown in sterilised soil, and inoculated with the sap of affected plants. There was no evidence manifested for the transmission of the disease in the material used in these preliminary experiments, but it was recognised that further work along these lines should be carried out when the glass house was available. Similarly, no results were obtained by inoculating sterilised soil with three species of fungi which were isolated from the roots of some specimens of plants affected with Bunchy Top. Further, the association over a long period of diseased and healthy plants in sterilised soil and in the same pot, out-of-doors, so that the roots were in intimate association, failed to produce the disease in the healthy plant (an experiment which has since been repeated with several plants under glass house conditions with the same results). Meanwhile, considerable work was accomplished on the experimental plots.

One of these with excellent soil had previously been affected with Bunchy Top, and after being leased has been thoroughly ploughed (part of it had rested for a period of several months) prior to the planting of the same by the Investigation Committee in October, 1924. The plants were selected from various areas—some were plants which appeared to have stood out against the disease in affected plantations, some which appeared to have shown some signs of healthy constitution taken from a deserted plantation, healthy plants from Bribie Island and Bracalba (Queensland), and three species of wild bananas from the neighbourhood of Cairns. The objects in this experiment were to determine the possibilities of resistance in local stocks, the possibilities of recovery from the disease, to make an intensive study of the incidence of the disease in originally undoubtedly healthy plants, and to determine the possible effects of cultural treatment in upholding resistance in healthy plants, and the possible resistance of wild stock to the disease.

Another plot on virgin land which had grown lantana for eight years was cleared and planted with healthy stock from Bracalba. It was considered that, if soil factors such as physical and chemical constitution, bacteria, fungi, or nematodes played the major role in the direct production of the disease, it was possible that the plants on the plot of virgin land would stand out in contrast to those on the other plot which had carried Bunchy Top plants.

The early outbreak of disease in the plot of virgin land in January, 1925, and its rapid development throughout that plot within a few weeks, contrasted with the very slight development of the disease on the other plot, came as a surprise, and led to an intensive study of the conditions prevailing in this plot. It was noticed that aphides were particularly abundant on this plot, an abundance possibly to be attributed to the topography of this lower plot being responsible for the bringing about of conditions more favourable for the aphides.

At once aphides were transferred from affected plants to healthy plants in sterilised soil placed under nets in the grounds of the laboratory, and the disease made its appearance in these experimental plants in about three weeks. The experiments were repeated by transferring aphides from affected to healthy Bracalba plants grown under nets in the University grounds at Brisbane, where the disease appeared in several plants in twelve days. Thus a definite lead was established to the investigation, and at once preparations made for following up these results in the glass house, arrangements for the construction of which had then been completed. The success of the later experiments has been set out above. The Supervisor welcomes the opportunity of stating that the results obtained are largely due to the outstanding ability and enthusiasm of the Assistant Plant Pathologist, Mr. Magee, and the keenness, diligence, and practical ability of the Horticulturist, Mr. H. Collard. To them he owes everything in the accomplishment of that portion of the task now completed.

Photo: Poulsen Studios.] PLATE 116.—AGRICULTURAL BANK, QUEENSLAND—INSPECTION STAFF, 1925.

Front Row (from left): A. D. Soares, J. Smith, A. P. Deshon (Assistant Manager), A. H. Smith (Manager), W. R. Heathwood, A. C. Palmer (Senior Clerk), C. H. Thrupp.

Second Row: S. Stevens, A. H. T. Bedford, C. S. Ross, E. W. Everett, P. J. Richards, W. B. Smith.

Back Row: O. Byrne, V. T. Barkla, E. W. Wanstall, K. Hunter, P. J. O'Donnell, G. H. B. Watson, R. J. Calder, J. P. C. Toft.

Insets: A. Harrison, W. S. Robinson. *Absent*: F. W. Haynes.

AGRICULTURE IN QUEENSLAND.

By H. C. QUODLING, Director of Agriculture.*

Maize.

Last July and for a few successive months, a superabundant crop was harvested. The average yield per acre proved to be higher than for any previous season in the history of the State. On the Darling Downs, where maize yields are very often irregular, it was not uncommon to find large fields averaging 60 bushels per acre. Returns from other districts were also good, and those on the Atherton Tableland constituted a record.

The most disquieting factors were the lack of demand and the absolutely low market price for the grain. Southern States also had abundant crops, and it was brought home in only two realistic a way to producers that the motor was effectively usurping the horse as a means of transport. Shipment overseas was the only possible method of relieving market congestion, and luckily maize was in short supply. The net prices realised furnished shippers with a small margin of profit, enabling them to handle an appreciable quantity of grain. The largest individual shipment was a parcel of 5,000 tons of Atherton-grown maize from Cairns. In Southern Queensland 2,185,176 bushels were inspected and passed for export. Judging by reports, the grain carried well and opened up satisfactorily.

Season 1924-25.

Throughout the whole of planting season, the maizegrower found his position to be most unsatisfactory; there remained a big carry-over from last crop, and prices for the grain were about on a par with the cost of production. As a consequence a lesser area was put under crop. On the Atherton Tableland, where the maize storage silos of 9,000 tons capacity were put into commission for the first time, the Pool Board had to cope with an extraordinary situation, with a crop exceeding 18,000 tons. This year, a lesser area was cropped, with a consequential reduction in output, which will probably run into a few thousand tons for this district alone.

In Southern Queensland, more particularly on the Downs and in parts of the Burnett district, much loss—70 to 80 per cent.—was occasioned to standing crops by a plague of mice. Stacks of cobs awaiting the thresher, and bagged grain, have also been taken toll of. These causes were contributory to an improvement now taking place in the price of maize.

Seed Maize Improvement.

The officer responsible for the technical work involved in the improvement in type and yield of grain, Assistant Agricultural Instructor C. McKeon, has demonstrated the value of its application in the field, and the method of selection and propagation of high-yielding strains for subsequent sale to growers is undoubtedly exercising a marked improvement in the quality and cropping capacity of Queensland-grown grain.

Maize Reaper-Thresher.

The recently invented maize reaper-thresher, to which attention was drawn in last year's report, proved most suitable for the work for which it was designed. Manufacturing was taken up by the Eclipse Windmill Company, Toowoomba. The work performed by the machine proved most satisfactory, and several are now in use in different parts of the Downs. The invention ranks with other notable efforts of Australians, and promises to have a far-reaching effect in reducing the cost of production of maize. A practical grower at Cambooya who purchased one of the machines supplied figures respecting harvesting costs after allowing for fuel, wages, horses, interest on capital value, and depreciation, and these showed that the complete harvesting and bagging of the grain in the field cost 2½d. per bushel.

Wheat.

With a view to a first-hand study of the problems of the industry, an itinerary covering a survey of the principal wheat-producing districts was made last harvest. Evidence was available, generally, of the fact that growers are keeping up to date in the matter of labour-saving cultural and harvesting machinery, and that the time is not far distant when an appreciable increase in the area under crop may be anticipated.

---

* Taken from the Annual Report of the Under Secretary for Agriculture and Stock (Mr. E. Graham) to the Minister for presentation to Parliament.

In many localities wheat serves the dual purpose of a fodder and grain crop, and works in with sheep and dairying.

The existence of an established marketing organisation—the Wheat Pool—on which growers have direct representation, has engendered a spirit of confidence and optimism in the industry not present before the Pool was formed.

Figures respecting last season's returns have not been made available yet by the Government Statistician; those supplied by the Wheat Board show that an area of 177,779 acres was under crop for a yield of 2,600,000 bushels.

Prices appear to have been satisfactory, as overseas markets, although showing the influence on many occasions of American speculation, have generally been good. Some fair-sized parcels, shipped after harvest by the Pool Board, approximating 772,000 bushels, found a ready market. Had last season not been marred by continuous rains immediately prior to and during the harvest, inducing rust and an inevitable bleaching and sprouting of a proportion of the grain in the ear, there was every indication of an exceptionally heavy average yield. In some localities, late frosts in October also caught a number of crops on low-lying ground whilst they were flowering, and even up to the period when the grain was in the thick milk stage.

The amount of energy put into the preparation of the seed-bed for the 1925 crop, and the utilisation of additional land for wheat, foreshadows a pronounced increase this year in the aggregate area. Owing to the lack in the autumn of rain, the sowing of slow-maturing varieties grown for feeding off at first by dairy cattle, had to be abandoned. Light general rains, however, fell early in June and in time for the main planting season. Sowing has since been energetically carried out. Mice took levy of the seed wheat held for sowing, and caused much loss; even after the seed was drilled in their depredations continued. Some fields will, in consequence, be patchy, and in places a thin stand is inevitable. Notwithstanding this initial set-back, an optimistic view is warranted respecting the improved position of the wheat industry generally.

Wheat Experiment Work.

The data obtained were the result of the work of officers of the Field Branch, set out in detail in the reports of Agricultural Instructor A. E. Gibson and Assistant Agricultural Instructor C. S. Clydesdale, and proved invaluable in determining the better types of wheat to persevere with in the all-important work of selecting suitable varieties for the several districts where wheat is commercially grown. The inspection of the various wheat plots made just before harvest time, according to arrangement with the manager of the Roma State Farm, proved most helpful in permitting observation work on the large number of new cross-bred wheats produced by that officer, which were under trial at a number of different centres. As the season was generally conducive to rust, certain resistant strains were selected for further propagation. It is gratifying to note that some of the more recently fixed strains of wheat show great promise.

As the results obtained by the establishment of wheat experiment plots in different districts have been most encouraging, plans were made this year to extend the scheme to take in the following places:—Inglewood, Pratten, Hermitage, Allora, Kaimkillenbun, Jandowae, Pittsworth, Southbrook, and Murgon. Increased areas of promising varieties gradually worked up from single-row tests have been planted, and a comprehensive series of tests is being carried out at several of the more important centres.

Canary Seed.

During the season considerable improvement was shown in production and price, 955 tons being produced, the estimated value of which was £33,425. Now that a pool is operating, market control is possible. The season before last canary seed was low in price, and the carry-over stocks too heavy to induce extensive planting.

It is now satisfactory to be able to record a more healthy condition of the industry.

English Potatoes.

Apart from the very big trading connection of Southern ports with those north of Brisbane, importations recorded in Brisbane by sea and rail from 1st July, 1923, to 30th June, 1924, totalled 356,798 bags, with an estimated value at £8 per ton of £219,568; similarly, for the corresponding months of 1924-25, 234,364 bags valued at £144,224. Those figures are sufficient to indicate that potato-growers here are, in the aggregate, losing large sums of money through not catering for requirements. Generally there are two distinct planting seasons—spring and autumn. The quality of Queensland-grown tubers is, in the main, good, and it is difficult to assign a reason for the anomalous position disclosed.

The Department has made a practice of introducing potato varieties that have proved popular in the South to different districts, testing them in the field, and subsequently ensuring that the better kinds are brought into cultivation.

In the North, the Instructor in Agriculture is endeavouring to initiate a system of maintaining a continuity of seed supplies between the coastal and tableland districts, in order to obviate the heavy expense now incurred by the purchase of Southern seed.

Onions.

Insufficient attention is paid to this crop in Queensland, as undoubtedly a good market exists. As with English potatoes, appreciable quantities of onions are brought from the South. The Brisbane trade from Southern States by sea and rail reached a total of 55,818 bags from 1st July, 1923, to 30th June, 1924; and for a similar period in 1924-25, 40,808 bags.

Oats.

During the season it was noted that more attention was paid to this crop for making hay, particularly in the Toowoomba and Southbrook districts. Wet weather had an effect on the quality of the product. In anything like normal seasons there is no apparent reason why greater quantities of oaten hay and chaff should not be grown to take the place of Southern fodder and keep more money in the pockets of Queensland farmers.

Barley.

The high yielding capacity of malting barley, and the ready market at hand at the Toowoomba malthouse, should make this crop more popular with Downs farmers. Similarly to wheat, which ripened at the same time as last season's barley crop, the grain was affected generally by too much wet weather, which caused its discolouration, and, in consequence, a slightly reduced price. There was evidence in the barley fields of too great a degree of smut and of weeds introduced with Southern-grown seed, disabilities which call for preventive measures.

Cape and skinless barley were found to be popular among dairy farmers, who used these varieties to a considerable extent for grazing off to make up for the deficiency of natural pastures, so much in evidence on small holdings stocked beyond all reasonable limit. On areas (particularly on the Darling Downs) coming under this latter category, the practice of lightly working soil surfaces in paddocks for drilling in barley for grazing off is well worthy of adoption.

Lucerne.

Prices for anything approaching prime cured hay, and chaff cut from this quality of hay, have been generally good. The recovery of lucerne fields, and the good crops obtained during the spring of last year, could not have afforded more convincing evidence of the value of this plant. Ample scope exists for its increased cultivation, and dairymen and stock-raisers generally would be well advised to work systematically towards the fullest possible extension of their individual lucerne areas.

Tobacco.

The pipe tobacco industry remains in a parlous state, largely for the want of suitable flue curing houses, manufacturers having practically issued an ultimatum to growers that the flue-cured leaf is the only kind they are prepared to buy. The industry is worth putting on a good footing, as this kind of tobacco thrives well on the soils of the Inglewood and Texas districts, where leaf of prime quality is grown. Expert knowledge is essential for the resuscitation and reconstruction of the industry on modern lines, and the appointment of a qualified instructor is recommended.

In the North, particularly in the Bowen district, the growing of cigar tobacco is carried on in a small way. Here also much scope exists for the extension of this branch and the establishment of central depôts for the classification and treatment of the leaf. Australia imports large quantities of leaf, and the building up of the pipe, cigar, and cigarette tobacco industry is a matter of very great importance to the State.

Cassava.

The steps taken by the Honourable the Minister to establish cassava as a crop for the production of power alcohol, and the introduction during the approaching spring of large consignments of cuttings from Java, for planting up an area of

about 300 acres in the Mackay district so that supplies of cassava may be available for manufacturing purposes at the Plane Creek mill, should do much to start this industry on a sound footing. A commercial crop of this character, supplementary to sugar, should be invaluable in advancing agriculture in the North.

Upland Rice.

The importation of samples of different varieties was followed up by the establishment in different districts of small experiment plots, under the supervision of the Northern Instructor in Agriculture, who has reported favourably in respect to certain kinds. Next season larger areas will be propagated of these latter, with a view to extension work under field conditions. Upland rice comes under the category of a white man's crop, as it can be dealt with by modern labour-saving machinery. Certain parts of the North produce excellent rice of this description, and it is hoped to make the crop more popular.

Renovation of Old Paspalum Pastures.

Dairymen who developed scrub lands some years ago, and planted paspalum, have found their pastures unresponsive and of a lesser carrying capacity than formerly. The same thing happened in New South Wales, throughout the Northern Rivers districts. The primary reason for the deterioration is the "matting" of the grass roots and a consequential reduction in plant vitality. Were it possible to break up the sod by ploughing, all would be well, and a new lease of life for the grass would result, providing the soil was naturally rich; however, the presence of stumps and roots, and at times the steepness of hillsides, does not always permit of this being done. With a view to the completion of data respecting the resuscitation of this kind of pasture, also the improvement in its nutritive qualities, two experiment plots were established on the North Coast—one at Maleny, on a deep rich, red, volcanic soil, and the second at Cooroy, on the characteristic clay loam resting on a clay subsoil. Full particulars of the plots and of the fertilisers used, both on ploughed and unploughed land, are given in the report of Assistant Instructor in Agriculture, C. S. Clydesdale, the officer deputed to carry out the tests.

Some indication of the stock-carrying capacity of the Maleny district may be gauged from the tonnage of grass cut from the experiment plots.

On 12th December, 1924, one-half of the plots was ploughed and harrowed, the remaining half being harrowed only, the treatment with fertilisers being the same for each series, these being applied ten days later.

A cutting of grass was taken from the hurdled area on each of the sixteen plots on 25th February, 1925, the heaviest yield being from Plot 8, one of the ploughed and fertilised plots, which gave a return of 4.63 tons per acre. On 15th April, the four months' growth of grass on the uncut portion of the different plots was weighed. In this instance the tonnage on Plot 8 was 7.03 tons per acre. This latter figure, however, was exceeded by two of the unploughed fertiliser plots—6A and 7A—which gave the high returns of 8.79 and 8.12 tons of grass per acre.

As the Agricultural Chemist, Mr. J. C. Brünnich, is engaged in the analytical work on the soil, and on the grass as it is cut from each respective plot, valuable information should be forthcoming at the conclusion of the tests.

During the approaching season it is purposed to establish additional experiment plots of this description on the Atherton Tableland, where paspalum pastures are also less productive than formerly.

State Clydesdale Stallions.

Owing to the demand for the services of the six horses originally purchased, it was found necessary to send out two additional sires belonging to the Department. The districts participating in this way were: Wallumbilla-Roma; Chinchilla; Crow's Nest; Cunningham-Pratten; Laidley; Beaudesert (two horses); and Mary Valley. The aggregate number of mares receiving service was 455.

"Fabric's Heir," used in the Crow's Nest district, died before the season was finished, as the result of a twisted bowel.

"Baron Again" developed stringhalt, and was gelded in June this year.

Arrangements for the examination and approval of mares for the 1925 season are well in hand. An early start was necessary to permit of Mr. Veterinary Surgeon McGown taking up his duties as chairman of the recently established Stallion Board for Southern Queensland, which starts to function on 1st July.

STATE FARMS.

Roma.

The manager of the farm stated in his annual report that "the 1924 season will long be remembered as one in which growers had an unenviable experience. Prospects were not good from the very first, and absence of rains delayed the seasonable germinating period for nearly two months. After the rains in the middle of July, exceptionally favourable conditions for growth were experienced which induced rust. Continuous rains followed, and the combination was disastrous through lodgment of crops, the heavier yielding varieties proving very difficult to harvest. In the generality of cases, the grain was discoloured, and a proportion was damaged through sprouting in the ear."

It was evident that, from the standpoint of an experimentalist, much valuable data was forthcoming, as it was possible to promptly arrive at a decision respecting the ability or otherwise of certain varieties to resist rust.

"Florence," the variety so much in favour throughout the wheat-growing districts, also a number of commonly grown wheats, were badly attacked by rust. Several of the Roma crossbred wheats stood up, however, to the visitation, and matured good-quality grain. This result furnished proof that in breeding and selection work it was possible to transmit the character of rust resistance through one parent, even when, on occasion, the other parent plant used in making the cross was susceptible to rust. Two rust-resisting wheats employed in this way as individual parent plants—Warren a bread wheat, and Cretan a macaroni wheat—gave excellent results. Similarly, it was shown in other crosses, notably those where Cretan was crossed with the well-known Comeback wheat and bred back again to Cretan, that the rust-resisting quality of the Cretan parent was perpetuated. Many other examples of the combination of desirable unit characters were forthcoming, including another group of Cretan with Bunge and Gluyas, which gave great promise.

Research work of this character will be given practical expression by the propagation of certain of these new wheats, in order that growers may have the assurance of a return in rusty seasons, a circumstance of very great significance in the stabilisation of this important industry.

The season's work directed towards the breeding and testing of varieties and the raising of pure strains of seed for distribution and sale were actively pushed on with; 12 inches of rain, however, in October militated against both the quality and yield of grain.

The wheat-planting scheme for this year is now practically finished, 30th June, with the exception of about 30 acres to be planted with quick-maturing varieties early in July. All the earlier sown wheat was above ground and well ahead of last year's crop in this latter respect.

Plant improvement work and the propagation of selected varieties were continued in respect to several crops—cotton, peanuts from Java, Sudan grass, cowpeas, field peas, and sweet potatoes (forty varieties). In the citrus orchard, a number of unprofitable trees were removed, and the land turned to account for experimental crops. Olive trees in the avenue and plantations did well, Hardy's Mammoth proving to be the heaviest bearer.

Certain varieties of grapes proved resistant to black spot, which was generally in evidence on account of the wet season, viz.—Madeline Royal, Ferdinand de Lesseps, Muscat Hamburg, Doradilla, and Belas Blanc.

With a few exceptions, the date palms imported from Algeria failed to strike. Deglet Noir seedlings have been planted instead.

Gindie.

For the six months ended in February this year, the rainfall was well above the average, and proved to be one of the best seasons experienced for several years. From March to June the reaction set in; March proved to be very hot, with only 38 points of rain; April was without rain altogether; and 37 points fell in May. Luckily, a little over an inch of rain fell in June, consequently during the last four months under review the natural grasses on the Downs country dried out; however, those on the better sheltered timber country retained some nutriment, enabling the stock to hold their condition. It is gratifying to note a general improvement taking place in the quality and kinds of grasses on the property. Mitchell, Red Flinders, and some of the best of the blue grasses are now showing up prominently in places.

The three studs maintained here—beef Shorthorn cattle and Clydesdale and Suffolk Punch horses—have all made satisfactory progress. The manager stated in his report that "in every case buyers who made purchases expressed their satisfaction at being able to procure animals of good quality, capable of improving their herds; also that the quality of the farm stock is slowly but surely improving, and

that no doubt was felt about the prospects of the institution as far as the production of the much-sought-after type of sire was concerned. Inquiries for herd bulls were frequent, and this was attributed largely to the fact that nothing but young animals of good conformation, constitution, and type had been sold as sires." The addition of a yearling bull to the stud, sired by Sir Anthony Hordern's four-thousand-guinea bull "Masterkey," was a decided acquisition, and should do much to continue the improvement work undertaken. Although a high price had been paid for the young bull, his breeding and type were of the best, and should ultimately exercise a most beneficial effect on the quality of the district's beef cattle.

The farm stock had received a good advertisement by winning a number of prizes at different shows, a bull bred on the place now having three championships and one reserve championship to his credit at Rockhampton, and an additional distinction of being the sire of three first prize winners at the recent show at the same city.

A special effort was made during the season to grow and conserve as much fodder as possible. Two silos, each of 110 tons capacity, were filled, and about 50 tons of hay stored. The outstanding crop for bulky fodder was Sudan grass, portions of the field yielding up to 15 tons of green stuff per acre, exclusive of a second cutting.

The June rains permitted the sowing of wheat on fallowed land, and the seed sown had germinated well.

Kairi.

The manager, in his annual report, stated that weather conditions throughout were all that could be desired; a mild winter was being experienced and there was every prospect of a favourable spring. Progress was made during the year by slightly extending the cultivation area. One hundred acres were cropped with maize for grain and for silage, and, in addition to minor crops, four acres were under sweet potatoes and arrowroot, and six acres under sugar-cane. Supplies of cane were made available for planting purposes, in accord with the scheme for renewing the vitality of certain varieties of cane by temporarily changing their habitat to the more temperate climate of the tableland.

Both the Jersey and Milking Shorthorn studs had made good progress. The demand for Jerseys was well maintained, and the progeny of the latest addition to the stud—"Retford Prometheus"—were most promising.

In the swine section the farm had met the demand for stud pigs. The establishment of a bacon factory at Floreat Siding, near Mareeba, had promoted greater confidence in the industry, which was expanding. To meet the demand for a leaner class of bacon a boar and three sows of the Tamworth breed were installed, so that pure-bred animals might be bred for sale. Additional sties and runs were added to accommodate the latter breed.

Although the services of a Suffolk Punch stallion had been availed of, the type of mare offering did not warrant keeping a valuable horse for breeding purposes.

Evidence was noted of a desire on the part of farmers for more experiment work with crops and pastures. If this were undertaken two additional hands would be required.

Warren.

The principal growing season during the summer months was marked at intervals by excessively hot weather, which exercised an injurious effect on all grain and seed crops. When arranging the fodder crop trials, ample provision was made for supplies for filling the two 110-ton silos. Sudan grass gave extraordinary yields, particularly on alluvial land, and demonstrated its producing capacity, although to a lesser degree, on poorer types of soil.

The extension of cultivation land was consistently followed up, and this permitted of the growing of rotation crops on areas which had been consistently cropped since the initiation of the farm.

Special attention was paid during the year to the testing of a variety of crops likely to fit into a cultivation scheme to meet the requirements of a mixed farm.

Fertiliser and spacing experiments were carried out with Durango cotton. Although growth was checked through want of rain at a critical period, when the plants shed an appreciable portion of their "squares," the quality of the lint was generally good. The class of season favoured ample feeding space for the plants. Special attention was given throughout to the maintenance of a soil mulch by constant cultivation.

The Ayrshire stud was well maintained, and the system of "line breeding" has shown how effective it is in breeding to type and for production. The young stock sired by the Victorian-bred bull, which gave such a good account of himself in the Melbourne Exhibition, show every indication of deep milking qualities.

The Berkshire pig section has been improved in the matter of additional stud pigs and accommodation. The addition of new strains and, more recently, the purchase of a prize winner at the Royal Easter Show in Sydney, will permit of carrying on breeding for some time to come. It is gratifying to note that the farm-bred pigs are so much sought after. This stud has undoubtedly exercised a very great improvement in the type of the district's pigs, and was drawn upon also for stud boars for the Kairi State farm stud in North Queensland.

In what may be termed the educational section, good support has been forthcoming from senior pupils of the Stanwell State School. The regular weekly classes in saddlery, blacksmithing, and in elementary agriculture have been fully availed of. Education imparted in this way should not be without its influence, both on the pupil and on his parents.

So far, the cochineal insect introduced to a patch of pear growing along the bank of Stony Creek has not made much advance in destroying the pear. Probably, when fresh colonies of insects are bred, a more pronounced result may be forthcoming.

Home Hill.

During the year irrigation experiments were carried out, embracing different methods of applying water to sugar-cane. Careful records of cost of production were kept, including cultivation, harvesting, stabling and water rates, and cost of applying water.

Three plots, each an acre and a quarter in area, were ratooned with the following results:—

Plot A—Cultivated and irrigated according to prevailing district methods, yielded 22.7 tons per acre. Cost of production, 35s. 7d. per ton.

Plot B—Cultivated similarly to Plot A but watered regularly down the rows, yielded 25.9 tons per acre. Cost of production, 34s. 10d. per ton.

Plot C—Under the Hawaiian system, yielded 42.3 tons per acre. Cost of production, 29s. 10d. per ton.

On two other plots of plant cane, each .65 of an acre in area, the results were not so satisfactory, owing to the difficulty of accurately regulating the supply of water. In this series of 82 rows in each of the 2 plots, 41 were fertilised at the rate of 650 lb. per acre (Howe's mixture), and the remaining rows unfertilised.

Plot D—Grown and irrigated according to local custom, the fertiliser plot yielded at the rate of 32.6 tons per acre, whilst the unfertilised portion yielded 31.9 tons per acre.

Plot E—Grown and treated under the Hawaiian system, the yields were 24.6 tons from the fertilised plot and 34.9 tons from the unfertilised portion.

Further tests with the ratooned cane are being carried out.

Field Crops—Sugar-cane.—28¼ acres were harvested for a return of 759 tons 19 cwt. 2 qr., averaging 26.9 tons per acre, 6 tons per acre above the average for the district. Plant cane yielded 31.3 tons and ratooned cane 21 tons respectively per acre.

Experiences so far point to the possibility of the Hawaiian system superseding the ordinary local methods of applying water.

Cotton.—Monthly planting trials (October to January) and a series of sixteen spacing tests were carried out in accordance with plans provided by the cotton specialist. The plant thrives well in the district, provided there is sufficient moisture in the soil, a factor now under control by means of irrigation.

Ratoon cotton tests were also carried out. Generally speaking, crop yields were not heavy, and the price of seed cotton is insufficient to make this crop a payable one under existing conditions.

Lucerne.—Half of the area of 2¾ acres laid down two years ago was worked up and designed for a shorter flow of water. This has permitted of better control, and the second sowing shows better promise.

Sweet Potatoes.—Upwards of 2½ acres were planted with different varieties. Trials in small plots gave the following returns in tons per acre:—Director, 25.45; Home Hill, 16.95; Giant Gindie, 14.72; Ruby, 14.15; Vitamine, 12.36; Mammoth Cattle, 12.24; and Seedling No. 1, 10.2.

Mammoth Cattle and Ruby proved to be the better table kinds. Prices were too low to pay even for digging, and use was made of a quantity for feeding to horses.

Miscellaneous Crops.—An assortment of crops was tried out in the experimental grounds, comprising:—Rice (9 varieties); velvet beans (3 varieties); cowpeas (3 varieties); taro (7 varieties); peanuts (4 varieties); yams (2 varieties); Adley (Job's Tears); horse and green grain; chick and pigeon peas; Japanese clover; Gingellic oil; and Soya beans. Selections were made of the more suitable varieties for further propagation. Generally speaking, the results were encouraging. Further tests are necessary to determine whether certain of the products will be of economic value.

Hermitage.

Owing principally to the late planting season for maize in 1923, and the rains in June, 1924, harvesting was not completed until well into August. The crop, however, of Funk's Yellow Dent grown from departmental seed was an excellent one and yielded sixty bushels to the acre. Owing to the low price, a few hundred bags were threshed and the balance stored on the cob. This stored supply suffered much damage from the plague of mice, and was recently threshed; the advantage of holding on, and the realisation of an extra shilling per bushel, were discounted by the amount of grain eaten and damaged by mice.

The cropping scheme carried out with wheat was based on tests with a number of departmental varieties, grown to determine their value for cropping on the heavier types of soil common to this portion of the Downs, and for raising seed for further extension of those kinds which showed superiority in field characteristics over existing varieties. Crops generally were seriously affected by continuous wet weather just prior to and during the wet harvest. Rust did a good deal of damage. Strictly from an experimental standpoint, the loss was timely, as it clearly showed the superiority of certain of the Roma crossbred wheats, particularly those in which Warren was one of the parents, this variety being very rust-resistant.

The farm was used for the reception, storage, and grading of several hundred bushels of wheat from the departmental experiment plots. Later on, owing to the alarming progress made by the mice plague, this wheat was railed to Brisbane prior to sale to farmers.

Summer Crops.—Liberal sowings were made of saccaline and feterita, the former to provide green fodder for ensilage. We now have upwards of 150 tons on hand in silo and stack.

Phalaris Minor.—The wet season proved favourable to this grass, several acres having been prepared and planted on the 17th and 18th July, 1924. Four months afterwards the crop was cut with reaper and binder; the weight of cured hay taken from a measured acre and put over the weighbridge was 1 ton 15 cwt. 2 qr. From seeding to harvesting 1,233 points of rain were recorded. Although an annual, this grass has proved its value for grazing off and for withstanding hard winter conditions and heavy frosts. In these respects it proved superior to oats and barley. Much interest was taken in this crop and a quantity of seed was sold.

Crossbred Sheep.—The flock of between two and three hundred, maintained on the farm, has done well. Lambs sired by Lincoln rams invariably made high prices. To correct the coarseness associated with Lincoln crossbreds, six fine-woolled merino rams of good size and constitution were purchased.

QUEENSLAND TREES.

By C. T. WHITE, Government Botanist, and W. D. FRANCIS, Assistant Botanist.

The Australian Olive (*Olea paniculata*) is a fairly common tree of Eastern Australian rain forests or "scrubs." It attains a height of about 100 ft., and a stem diameter of about 2 ft. The stem in the large trees is sometimes flanged, as shown in the picture accompanying this article. The bark is brown or grey in colour, often wrinkled longitudinally and with small warts arranged in rows in the wrinkles. The sapwood is white when first cut, but after being exposed to the air for ten or fifteen minutes it turns pink. The timber is light in colour, fairly hard and heavy and closely grained, and should be useful for cabinet work. The Australian geographical range of the species extends from the Hunter River in New South Wales to the Atherton Tableland in North Queensland. It is also found in New Caledonia and Lord Howe Island.

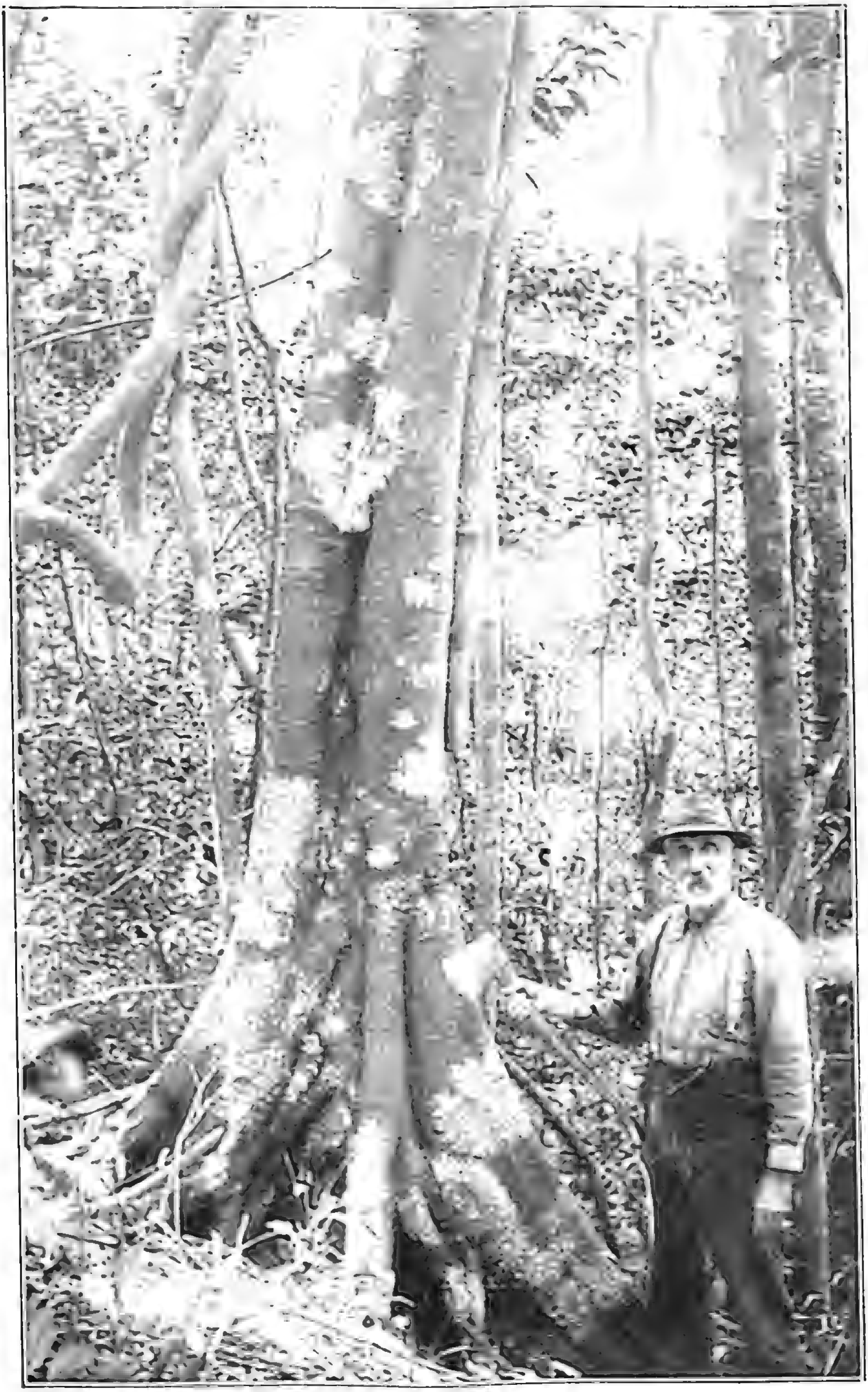


Photo: W. D. Francis.]

PLATE 117.—THE AUSTRALIAN OLIVE (*Olea paniculata*).
A tree in the Kin Kin rain forests.

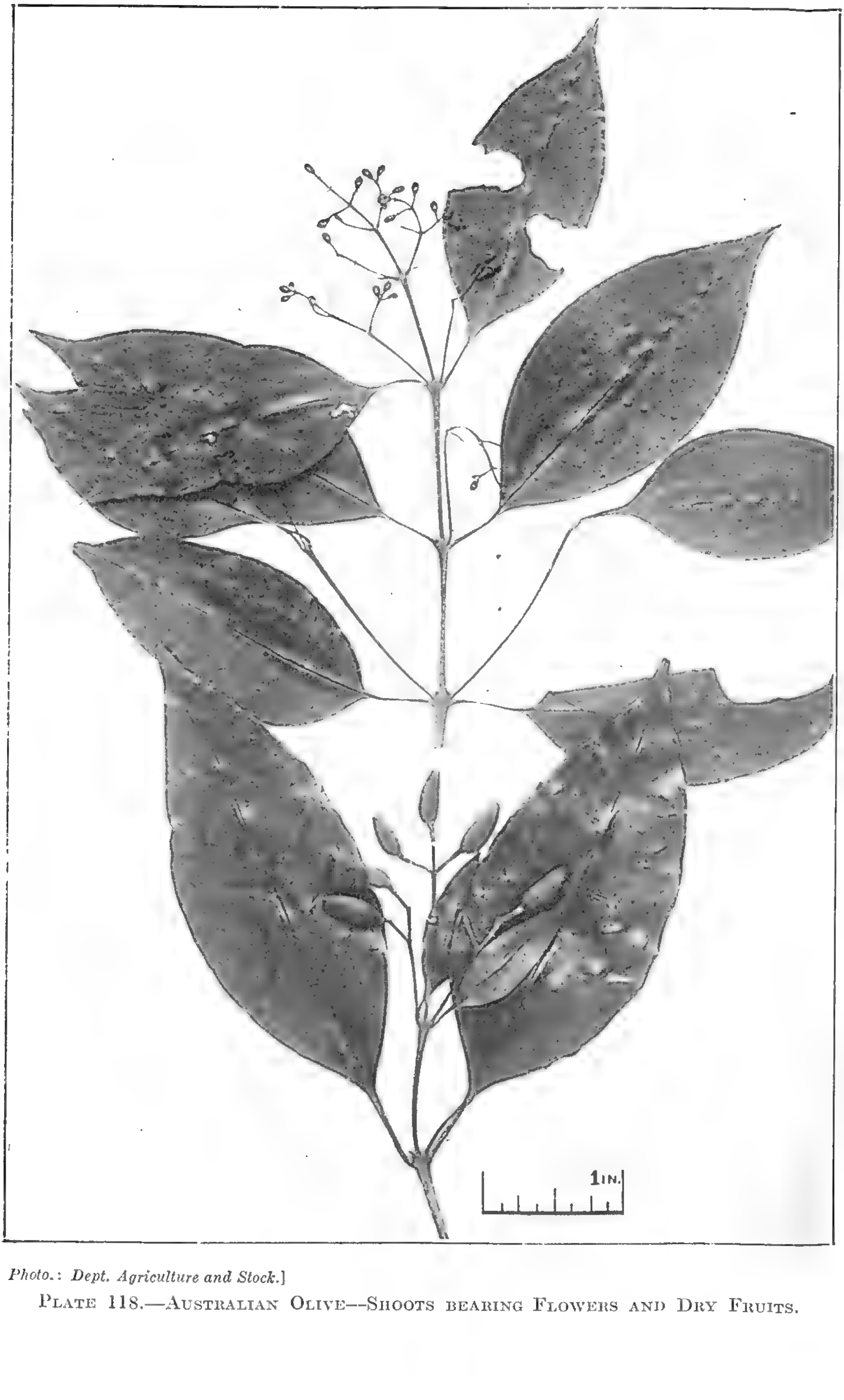


Photo.: Dept. Agriculture and Stock.]

PLATE 118.—AUSTRALIAN OLIVE—SHOOTS BEARING FLOWERS AND DRY FRUITS.

Bureau of Sugar Experiment Stations.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (22nd October, 1925) from Mr. W. Cottrell-Dormer, who is investigating cane pests and diseases:—

MOSSMAN.

Diseases.

Leaf Scald.—Leaf Scald is undoubtedly the most serious disease of the Mossman district, and most farms situated within a radius of about 7 miles of the town are more or less infected by it. Especially is this the case where Clark's Seedling is grown since this is a very susceptible variety to this disease. This is rather a good time of the year for the detection of Leaf Scald since it is now showing mostly in what has been named, by Mr. D. S. North, of the C.S.R. Co., the "wilting stage" of the disease; at this stage of the infection certain canes, and particularly Clark's Seedling, are seen to gradually develop dead streaks in their leaves similar to those caused by Gumming Disease and then suddenly to wilt, as though from a grub attack, and die. A very noticeable feature of stools killed in this manner is that the dead leaves are of a peculiar dark colour, which is really quite different from the appearance of stools killed in other ways, and that these leaves tend to curl and crinkle a great deal. Thus, when Clark's Seedling is mature, it is generally sufficient, when one is searching for Leaf Scald, to look over the field from some prominences—say, from horseback or from the tops of a fence posts—when the dark, dead leaves of severely affected stools will at once be noticed. Many of the fields of Clark's Seedling inspected by me on this occasion showed a big percentage of these dark-leaved stools which signifies that Leaf Scald is causing appreciable, though probably avoidable, loss.

I have said that this loss is probably avoidable. We have not sufficient data on the subject of cane diseases in the North to state definitely that this loss actually is avoidable, but this is no reason why growers should not follow out the measures prescribed from time to time by the Bureau. It is evident, since Leaf Scald is an incurable disease, that no amount of careful cultivation or fertilising will alone rid a farm of Leaf Scald—it is also necessary that clean, healthy seed be planted in place of the old infected material. Most of the farmers about Mossman would be well advised to select some small block of land in as isolated a position as can be practically handled and plant up some healthy Clark's Seedling in readiness for next year's planting season. No Clark's Seedling within 7 miles (stress) radius of Mossman can safely be used for this purpose without a special inspection by an officer of the Bureau, but plenty of good, healthy cane is available about Ferndale and the Upper Mowbray, *i.e.*, the 14-Mile; and since the mill management has expressed its desire to foster all work of this nature, no serious trouble should be encountered in arranging for the purchase of plants. This is a system of planting which should be kept up for two or three years, or until all of the old stock has been replaced.

Leaf Stripe.—This disease is now in a more or less dormant stage in this district; it is to be seen mainly in what is known as the leaf-splitting stage; many infected stools have died earlier in the year, and only a few remain which are sufficiently badly attacked to show this leaf-splitting stage. It is impossible, therefore, at this time of year to form even an approximate estimate of the extent of the infection.. Many fields, which were found to be rather badly infected on my last visit during the summer months, now—beyond some split and curled up leaf shreds, which droop from certain rather deformed sticks, and a few dead stools here and there—show but little trace of this serious disease. Such is the way of this insidious enemy—each one of those harmless-looking, curled, dropping leaf shreds contains many hard shelled spores which are waiting for the warm, damp, wet season to return, when they will germinate and infect fresh plants. Thus the grower who thinks to himself that after all he has not fared too badly with this disease, since there is so little evidence of its presence, is enjoying a false sense of security. It is almost invariably the case, at least in the North, that the ratoon from this infected cane suffers far more severely than the previous crop, and even now some fields of ratoon B.147 may be seen which are hardly worth harvesting.

Leaf Stripe disease appears to be at its worst in the Saltwater area. Growers here should aim at giving their land more fallowing than they have been in the habit of doing. A cane which seems to be showing great resistance to Leaf Stripe and is doing quite well in the Saltwater area is Q. 813.

(I am indebted to Mr. D. S. North for much valuable information on the subject of diseases of sugar-cane.)

Foot Rot.—Foot Rot, or Root Rot, a fungus disease of young plant cane, is causing appreciable damage in some fields about Mossman, and in one case, where a count was made of 1,000 young shoots, 62 were found to be severely affected by the disease. Where Foot Rot was observed it was invariably noticed that the young cane had been covered too soon after striking, probably on account of the prolonged dry weather. It has been found in the southern districts that this early covering of young plant cane predisposes the plants to this disease.

Insect Pests.

Grubs.—Taken on the whole, grubs have not done serious damage in the district this year; however, one or two farms on the Upper Cassowary and one at Whynabeel Creek have suffered rather badly.

Borers.—Both Beetle Borer and Moth Borer are to be found about the Mossman district, but neither is responsible for appreciable losses. An examination of a few sticks attacked by the Beetle Borer at Whynabeel Creek revealed the presence of many Tachinid fly pupæ. These flies were originally liberated here by the Hawaiian Entomologists, and have evidently done good work.

Wire Worms.—The Wire Worm, a slender brown creature attaining a length of about 1 in., is probably the most important insect pest here, and apparently does damage to cane all the year round. This insect attacks the eyes and young shoots of young plant cane and effectively prevents stooling, and often germination, of the cane, thus causing very poor strikes. When the "misses" are "supplied," it frequently happens that the fresh plants are again attacked and killed, and it is often necessary to plant these "misses" three or four times before success is attained. I would therefore suggest that crude naphthalene powder or vapourite be used when planting "misses." A little of the powder, say, one tablespoonful, should be mixed with the soil where the fresh plant is to be placed. It must be understood, however, that this is merely a suggestion, and to the best of my knowledge has not yet been tried against this species of wire worm.

Rats.—Rats are now doing very severe damage to many fields, one farmer having estimated his loss in a crop of 1,000 tons at 300 tons. This is merely loss in tonnage and does not account for the higher cutting rates which obtain in rat-eaten cane. A bulletin on "The Field Rat in Hawaii and its Control," by C. E. Pemberton, of the Experiment Station of the Hawaiian Sugar Planters' Association, is being forwarded on loan to the mill management, as I understand that the latter intends starting a campaign against the rat pest.

Wallabies.—Mr. J. S. D. Crees stated having had success in poisoning this cane pest by the use of poisoned figs. The fruit of the wild forest fig-tree is partly slit and a little strychnine inserted into the opening formed. These poisoned baits are then strewn along wallaby "pads" leading into the cane paddocks.

BABINDA.

Since much of what has been said above also applies to this district, I shall but briefly enumerate the diseases and pests observed here.

Diseases.

Leaf Scald.—This disease is causing serious damage to crops of Clark's Seedling between Babinda and Fishery Creek; in fact, no single field of this variety was seen in these parts which was not well infected. None of the Clark's Seedling in the northern end of the Babinda area is suitable for a change of plants. Ample healthy cane can, however, be found about Kamma and Hambledon, and these are the sources whence "new" cane should be drawn, but growers should first arrange to have the cane they contemplate introducing examined and passed on the field before cutting by the Bureau's Laboratory at Meringa. Probably 100 per cent. of the few fields of Goru which remain in this district are also infected with Leaf Scald, while much of the Badila shows signs of the disease. The last-mentioned variety, however, does not appear to suffer severely unless physically weakened through some other cause, such as late cutting or grubs; the same applies, to a much less extent, to Goru. Healthy Badila may be obtained from the Bartle Frere Estate, where this variety is doing remarkably well on the red volcanic soil.

Since "knife infection" is a common occurrence with Leaf Scald, only knives which have been sterilised in boiling water should be used for cutting plants from material which has been introduced as healthy stock.

It should be noticed that I have specified certain places as a source of plants from the Cairns district, and laid down the condition that they should be passed by the Bureau while still standing uncut in the field before being used. It is evident, therefore, that the indiscriminate introduction of plants from other districts which has obtained in the past is not being advocated. On the contrary, I must again remind growers that this is a most foolish and dangerous practice, as has often been stressed by the Bureau.

Pests.

Grubs have been responsible for much loss of cane this year in the Merriwinni, Palma, McDonnell's Creek, and other localities. Several of the growers have been personally advised by the Bureau.

Beetle Borers, according to the general opinion of growers, are on the decrease, while the Tachnid fly parasite of this pest is, if anything, increasing in numbers.

Wire Worms, Moth Borers, and White Ants have done slight damage in parts.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (*19th October*, 1925) *from the Acting Entomologists at Meringa (Messrs. Burns and Mungomery)*:—

"Chlorocide" *versus* Cane Grubs.

A small consignment of Chlorocide "A" was recently received from a Southern firm with the request that experiments should be conducted against the common cane grubs. This fumigant, which at present is being tried in America against the common peach-borer, is a cream-coloured powder, somewhat moist, with a characteristic odour of almonds which on continued exposure to the atmosphere becomes much drier, and changes to a whitish colour. The manufacturers exhibit a caution notice on each tin warning users of Chlorocide against allowing it to come in contact with the skin owing to the toxic properties which it possesses.

As hitherto little was known concerning its insecticidal properties, various amounts of Chlorocide were tried in a series of laboratory experiments, the actual quantities being 30, 20, and 15 grain doses in small cages each holding about 10 cubic inches of soil, four cages being used with the 30-grain doses, three cages with 20-grain, and three cages with the 15-grain doses respectively. These cages were set up on 2nd July, 1925, and in the bottom of each cage one third stage grub of *Lepidoderma albohirtum* was placed. Each dose of Chlorocide was wrapped up in a cloth container and placed about half an inch below the top of the soil, and in the centre of each cage. Inspection of these cages on the following day revealed the fact that only one grub was in a sickly condition, whilst the remainder showed increased activity which seemed to indicate that the Chlorocide had some irritating effect on their epidermal tissues.

On looking at the cages on the second day after administering the doses, all the grubs were found to be in a more or less sickly condition, and on 6th July, 1925, seven out of the eleven grubs were dead with the remainder very sickly, whilst on the 7th all the grubs were dead, representing a mortality of 100 per cent. over a period of five days. The doses of 15 grains proved equally as effective as the larger doses of 20 and 30 grains in this instance.

From the fact that these grubs under the effects of Chlorocide, did not suffer any paralysis immediately, it occurred to us that grubs not under confined conditions might be able to burrow away from the doses of this fumigant. Accordingly, experimenting was continued on these lines and a cage was constructed which gave conditions as near to actual field conditions as possible, and the grubs had the opportunity of moving about 6 inches away from the fumigant in a lateral direction, and about 4 inches in depth. After allowing the grubs to remain in this cage for two days, they were found to have moved towards the gauze openings through which fresh unpolluted air was permeating. Another similar experiment under moister soil conditions confirmed this, and the grubs lived on under these conditions for two weeks apparently unharmed.

Another series of experiments was conducted to find out the minimum time necessary to confine grubs in actual contact with Chlorocide to ensure death of the grub. In the case of grubs confined with 10 grains of Chlorocide in a 9-inch test tube, then covered with soil, it was found that they had to remain from thirty to forty-eight hours, whilst those confined for three, six, and in one case up to twenty-four hours, revived.

The results of these two latter experiments proved somewhat disappointing after the results and mortality obtained in the first series of experiments; however, it can be readily understood when viewed in the light of the slow evaporation of Chlorocide as compared with other fumigants such as paradichlor.

Owing to the fact that this fumigant has just recently been put on the market, and arrived late in the feeding period of the grubs, no data has been able to be gathered concerning its effect on first and second stage grubs of *L. albohirtum*, but

it was thought advisable to report our experiences with this fumigant as far as we have gone, and we are of the opinion that Chlorocide, owing to its lasting and toxic properties, may prove a good deterrent against oviposition. However, a test plot under field conditions is to be laid out on some grub-infested land in the Cairns district during the coming season, and it is hoped that much valuable information relating to its effect on these notorious pests will be secured.

Grey-back Cane Beetle (*Lepidoderma albohirtum* Waterh.).

Large numbers of the pupæ of this beetle are at present hatching and the adult beetles are remaining in the pupal cells hardening and awaiting the first good soaking rains, which usually come in November, to enable them to escape from the soil. They are to be found at varying depths, the greater proportion unearthed for observation being at depths of from 9 to 24 inches, according to the nature of the subsoil.

Farmers would be well advised to note emergence of the beetles from the soil in their districts, so as to be able to ascertain the correct time following the flight of the beetles, to administer fumigants to the soil. Egg-laying commences about fifteen days after the beetles first appear, and continues over a period of several weeks, so that about six weeks after the beetles appear would catch the small grubs when feeding on the finer roots surrounding the stools, and thus give a better chance of coming within the reach of paradichlor. or fumigant applied, especially when it is applied to both sides of the rows of cane.

Many farmers leave fumigation until it is too late, and the prolonged rains of the ''wet season'' have set in, thus preventing a thorough penetration of fumes throughout the soil.

The Sugar-Cane Moth Borer (*Phragmatiphila truncata* Walk.)

This widely-spread pest of sugar-cane has been, and is, very prevalent throughout Northern canefields this season. Its depredations much resemble those of the beetle borer (*Rhabdocnemis obscurus* Bois.), and on this account it is frequently confused with the latter insect.

Infection of cane by this pest is generally worst in the cane plants adjoining headlands, and in young cane where trash has been left lying about. Young ratoons and shoots are usually the centre of attack, the tender central portion of the stems of these being eaten out, thus causing the central whorl to die, so forming ''dead hearts.''

Beetle borer attack is almost invariably confined to mature and almost mature cane sticks, and the boring may occur throughout the entire length of the stalks from the roots to the leaf sheaths.

The larvæ of the moth borer when fully grown vary from 1¼ to 1½ inches in length, and are cylindrical, tapering towards each extremity. The colour is generally (individuals vary very considerably) pinkish brown or light brown with numerous scattered dark-brown and pale-black spots mostly arranged in interrupted obscure lines running longitudinally on the body. These larvæ are voracious feeders and grow rapidly, the time occupied in the larval stage being only a few weeks on an average throughout the year.

Pupation takes place in a cell constructed by the larva inside the cane stem, usually just behind a leaf sheath or other part where the skin of the cane stem is soft, thus affording the moth an easy exit on emergence. The pupæ are brown, and are from ¾ to 1 inch in length.

The period occupied in this stage varies according to the season of the year, being much briefer in the warm months than in the winter time. From records kept from specimens bred at our Laboratory during the last month the average time spent in the pupal stage was from sixteen to seventeen days.

Breeding experiments from large quantities of material collected in the field from different farms around Gordonvale and Highleigh, have yielded one Hymenopterous parasite—a small black Braconid wasp, probably *Apanteles nonagriæ* Oliff, which is known to be a parasite of *P. truncata.* About 100 of these wasps have been bred out, as many as twenty individuals emerging from one borer larva. Parasitized larvæ as a rule do not ''sicken'' until nearly or fully grown (some when infected with dipterous parasites are even able to pupate), then the skin shrivels, shortly afterwards rupturing, and from it emerge a number of small cream-coloured maggot-like wasp larvæ which quickly enclose themselves each in small white cocoons clustered together around the shrivelled skin of their host. After five or six days' time the adult wasps emerge.

A dipterous parasite also attacks larvæ of *P. truncata,* but so far in breeding experiments this season none of these have been bred out.

FIELD REPORTS.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (27th October, 1925) from the Southern Field Assistant, Mr. J. C. Murray:—

Childers.

Cutting here is proceeding smoothly. Good results are being obtained at the mills, although the tonnage per acre is not heavy.

Farming Operations.—Good work is at present being done by the growers here as regards cultivation. Mechanical tractors are coming into more general use. Greater care is taken in plant selection, also with fertilizers. Growers are increasingly realising the value of green manures. Deeper ploughing and more subsoiling are being practised more extensively.

Diseases.—Mosaic is now being controlled. Its incidence in the plant cane is becoming slight in the Childers district. With a few more seasons' careful plant selection it should be stamped out completely. Seeing that this complaint is so easy to recognise the farmers should not be long now in getting rid of it. An observer is first attracted by the general pallor of the stool. A close examination will show that the paleness is caused by a number of short, pale, irregular blotches in the leaf, caused by the disease gradually destroying the normal green tissue.

Gum is showing freely in the D. 1135, in fact, it would be difficult to get really healthy plants of this variety in the Isis district. Sound D. 1135 could be obtained from the country lying between Bundaberg and the Elliot River, by careful selection.

General.—It is often said that certain canes are of no use because they are too low in density. While there is a difference in the c.c.s. return of various approved varieties growing under the same conditions, if there is a marked difference between the test of a cane grown under field conditions and the average test obtained before distribution from the Sugar Experiment Station, growers can often look for the cause in the soils they are farming. Cane growing in contact with surplus moisture often results in a juice of poor quality.

Canes with light root systems such as Q. 813 and H.Q. 285 are best for low soils, and those such as D. 1135 and E.K. 28 for the higher lands.

Coming into use at present are a number of new and useful agricultural implements. Conspicuous amongst these are a supply planter, invented by a Childers grower, a rotary cultivator, and a special disc plough for trash.

Farmers are recommended never to plough in trash where gum has been present, but to burn. If they do plough in the trash, a lengthy fallow should follow. The practice of burning trash of gummed cane was recommended by Dr. Cobb as early as 1893, in his first investigations on the Clarence River, in New South Wales.

Maryborough.

Heavy crops are in evidence on the river and some good c.c.s. returns, particularly for the H.Q. 285 and Q. 813. Farmers are recommended to leave this latter cane, if possible, until the season has advanced a month or so from the start, before cutting. The same, as several times pointed out, applies to the M. 1900 Seedling. Farmers here would improve their holdings by growing leguminous crops for green manure.

The Mary River farmers are advised to be very careful in plant selection. Patches of cane are dying from gumming disease, notably the Meerah, hence the need for a careful survey of blocks that are taken for plants. Efficiency is being aimed at by the growers, but all efforts will be neutralised if they do not get healthy plants. The use of lime could be tried more on the Mary River than at present, either pulverised limestone or burnt lime.

Pialba.

Crops are fairly heavy and average sugar returns satisfactory. Growers are, however, handicapped by long haulage with horse teams.

Farming Operations.—A marked extension in green manuring was noticeable, growers employing cowpea and maize. Some of the areas prepared and planted after green manures, are of splendid texture and appearance, and reflect great credit on the farmer. Tractors are more frequently observed working and giving good results. Manures are being more generally used. Organic manures are more favoured by growers than the more highly concentrated mixtures. As many growers were inquiring about the value of various organic manures the following information is offered:—

Guano (average): 7 per cent. nitrogen, 11 per cent. phosphorous pentoxide, 2 per cent. potash.

Seaweed (of which there are huge quantities on the Pialba coast)—(Fresh): 80 per cent. water, 0.7 per cent. nitrogen, 0.3 per cent. to 2 per cent. potash, 0.1 per cent. phosphorous pentoxide.

Dried Blood: 11 per cent. nitrogen, 2 per cent. phosphorous pentoxide.

In using seaweed, not only is plant food material added to the soil, but the condition and texture of the soil is greatly improved by such a bulky, porous substance.

Diseases.—Major diseases are present, but the most serious one, Mosaic, is being controlled. Gumming is present and causing loss in places. Quite a number of freakish growths were noticed. The cane tried to arrow, then returned to a vegetative condition through, probably, climatic influence.

Mr. E. H. Osborn, Field Assistant, reports (26th October, 1925):—

Mossman.

Conditions were fairly dry, and in a marked contrast to the earlier portion of the year as the following rainfall figures show:—

	Mowbray.	Mossman.	Saltwater.
January	12.86	18.03	18.30
February	12.10	19.32	28.31
March	23.38	37.47	45.93
April	7.71	11.74	14.56
May	.3	.4	.85
June	2.59	3.51	4.30
July	.34	.35	.50
August	.65	.58	1.37
September to 21st	—	1.07	2.21
	59.66	92.11	116.43

Owing to so much continuous rain in the early portion of the year, without the usual intense heat, the cane did not make its expected growth—the ratoons particularly. Very heavy damage has also been caused through rats in most parts of the cane areas. In the Mossman district the proportion of broken ground, watercourses and gullies, with heavily grassed lands adjoining cane paddocks, provides ideal breeding places for rats, and without systematic poisoning being carried out by all growers, heavy losses must always follow. Pigs and grubs have also been responsible for more losses than usual. Taking these causes all through easily accounts for the reduced estimate of about 9 per cent.

Very little early planting was possible, but some 55 acres of D. 1135, B. 147 upon Rossi and Co.'s, and a 15-acre plot of D. 1135 of Mr. England's upon the syndicate's line all looked very healthy. In the Mowbray area the scanty rainfall in July, August, and September had caused the cane to dry up considerably, but even then some very good Badila was being harvested.

Diseases and Pests.—Leaf Scald (in the quick-wilting stage) was seen to be very prevalent, principally in the ratoons in H.Q. 426 (Clark's Seedling), Green Goru, and Q. 903; and to a smaller extent in the plant of these varieties. Leaf Stripe or Downy Mildew was particularly hard to find at this period of the year, but was noticed rather badly in M.Q. 1 (Mossman Seedling) and B. 147. Suspicious leaf markings in a couple of paddocks of H.Q. 426 made the writer suspect the presence of such, but up to the time of departing from the area these doubts were not confirmed. Wire worms were as usual doing some harm in the Cassowary area. The growers were advised to try fumigating with carbon bi-sulphide.

Now that the writer is leaving the far northern cane areas, he desires to express his deep appreciation of the help that has always been given him in execution of the work of the Bureau by the managers, cane inspectors, chemists, and staffs of the several mills; and also by the secretaries of the several associations in each district. Working under such conditions has been very agreeable, and it is with many regrets that the writer leaves the northern cane area and its pleasant associations for districts further south.

Mackay.

Despite some weeks of very dry weather, this district looked uncommonly well, all the mills cutting well up to estimates.

Racecourse in general was looking very well, the crops cutting up to the estimate. H.Q. 426, Q. 813, M. 1900, N.G. 15, and D. 1135 are amongst the principal canes grown hereabouts. Up to date the density of the three firstnamed varieties had been very good indeed, with the firstnamed variety slightly ahead.

In the Cattle Creek area there are some very fertile black loam flats adjoining the creek, carrying some very heavy Badila. One paddock of plant will probably cut over 45 tons per acre. Nearby a 15-acre paddock of young plant Badila also looked very pleasing indeed.

Slight effects of frost were noticed upon several low-lying paddocks, but with the exception of a certain browning of the leaves, practically very little damage was caused.

Farleigh was handling a very big crop and had about one-half through. The main canes grown are H.Q. 426, M. 1900, Q. 813, with D. 1135, Badila, and Malagache, the latter extensively on the Homebush area.

Good returns in density were being obtained from the first three canes just then. Of Q. 813 the following figures may be of interest as showing its standover qualities:—

Cane.	Of Sample.	c.c.s. (Average).	
Standover, Cheribon	4	11.7	
Standover, D. 1135	1	10.7	
Standover, N.G. 15 (Badila)	2	12.2	Taken practically about the same date.
Standover, Uba	3	11.1	
Standover, Q. 813	11	13.1	

Pleystowe.—The density figures here also were very satisfactory. H.Q. 426, Q. 813, M. 1900, being the main contributory canes to such results. Some good returns were also being received from Malagache just then.

Marian Mill.—About one-half of the crop was also through in this area, for a very good c.c.s. Here again the best results were being obtained from H.Q. 426, Q. 813, and M. 1900. Some good returns were also coming from Malagache at this time.

Only a few farms were visited, but the writer was surprised and pleased to see such very good cane (especially M. 1900) in mainly an indifferent forest soil that had been under cane for some thirty odd years; moreover, a fair proportion of such lands are not too well drained.

Most of the M. 1900 showed numerous sticks of good length and weight, and several crops were seen that are cutting from 35 to 40 tons per acre, and from 15 to 16 c.c.s.

In several paddocks some very good Q. 813, both plant and ratoon, was noticed growing upon very poor country, one lot of second ratoons probably cutting at the rate of 18 tons per acre.

Several old growers in the locality say that the tonnage now cut per acre of these particular canes and H.Q. 426 is a long way ahead of that taken off when the ground was newer.

One of the helping factors is that most of the growers hereabouts are using very heavy dressings of a local earth lime; one well-known grower has used 125 tons in one year. Others use burnt lime, but all are quite satisfied of its benefits.

Many growers are green manuring with cowpea, and claim good results. Artificial fertilisers are also used, but most reliance is placed upon lime and green manure.

PROFITABLY FEEDING IODINE TO SWINE.

By JOHN M. EVVARD.*

The feeding of iodine in the form of potassium iodide to young growing swine in dry lot and on rape pasture has resulted—under Ames conditions where the college well water is very low in iodine (and where our experimental sheep flock has produced big necked or goitered lambs at birth in one year out of four, the last sixteen years), in three separate experiments, conducted in three different years—in increasing the average daily gain approximately 10 per cent. and likewise in decreasing the feed required for 100 lb. of gain 10 per cent. These are the findings of Professor Culbertson and the writer, and constitute part of the evidence backing up the reasons why we advocate the use of potassium iodide in the mineral mixture.

The pigs receiving potassium iodide made greater dimensional growth in height, in length, and in leg circumference. This shows that iodide feeding paid, and that its use was good insurance in that we cashed in on the premiums paid in taking out the iodide policy. But let's learn a little more about this iodide that we all must have, by studying the work of others.

When Courtois, in 1811, discovered iodine, he probably did not dream that within a little more than a century this halogen element would be proven essential for mammalian growth, the growth of animals which suckle young. Although iodine has long since been chemically classed by chemists along with fluorine, chlorine, manganese, and bromine, all constituents of the normal mammalian body, the real significance of iodide in animal nutrition did not find appreciation in scientific circles until the time of Baumann in 1895.

Iodine is now generally conceded to be one of the essential elements in mammalian (animals that suckle their young) nutrition and much effort is being made, particularly in goitrous regions to insure a supply of it in the foodstuffs or water, or both. McClendon has emphasised the use of iodine as a food material and studied its occurrence in the natural waters of all parts of the United States.

Baumann in 1895, almost thirty years ago, announced that iodine was a normal constituent of the thyroid gland, the double gland in the front part of the neck. In directing attention to this fact he gave the name iodothyrin to the world; this compound, for a number of years thereafter, being considered as the active principle of this ductless organ or gland.

The work of Picke and Pineles in 1909-10 and Kendall in 1919 made clear that iodothyrin is not the active principle it was once supposed to be, Kendall pointing out that it is not to be considered as "even a concentrated form of desiccated (dried) thyroid."

Kendall recently made a noted addition to the knowledge concerning the chemical nature of the active material of the thyroid gland. He isolated a substance which he named thyroxin or crystaline, iodine-containing compound, white, odourless, and tasteless.

Kendall, through biological experiments, determined that the isolated thyroxin does everything that desiccated (dried) thyroid does in the relief of cretinism and myxedema. Thyroxin has also been found to influence growth in a manner similar to desiccated (dried) thyroid. The iodine-containing thyroxin is of profound importance in regulating chemical reactions throughout the body.

The use of iodine by Marne and others, in the prevention and cure of simple goitre or throat enlargement, front portion, in school children, affords a striking illustration of the need of this element. The use of iodine in these experiments with children showed clearly that it was specific in the prevention of simple thyroid enlargement. The early experimental work was carried on at Akron, Ohio, which is in a goitre region.

The North American Indians and the inhabitants of Central America, as well as the Greeks and Romans, so Marne says, were strongly convinced that water was a causal factor in the development of simple goitre. A marked absolute decrease in the iodine store is noted in the developmental stage of all goitres in all animals. If most of the thyroid gland is removed before pregnancy or during its early stages, iodine meanwhile being excluded, the new-born will have enlarged thyroids; but on the other hand, if iodine is available, the young at birth will have normal thyroids. The ingestion of a milligram (but a very small part of a grain of which there are 7,000 in a pound) of iodine weekly by dogs prevents thyroid hyperplasis in the young pups. The thyroid has an extraordinary affinity for iodine, and if the iodine store is above 0.1 per cent. there is no disease.

---

* A prominent American authority on pig breeding and feeding and a well-known contributor to the "Chester White Journal."

Smith was the first to point out the value of iodine in the prevention of fetal anthyrosis when fed to pregnant swine. His studies on the composition of the feeds in the affected districts, from the iodine-standpoint, indicated that the available iodine was lower than of similar samples from unaffected districts. The investigations were carried on in Montana. This significant comment was then made by Smith:—

"If more iodine were fed to the pregnant animals in large sections of this continent, especially during the winter months, the young that they produce would be more healthy and more vigorous and the large number of weak and defective young animals that are produced annually would be greatly reduced."

Smith later pointed out that pigs which are born in the early spring months of March and April are more frequently affected with fetal anthyrosis and hairlessness (the hairless pig malady) than if they are farrowed in May and June. He likewise emphasised that even in badly affected regions the fall litters are usually normal.

That there is a seasonal variation in the iodine content of the thyroid gland was clearly shown by Messrs. Seidell and Fenger. They found that the thyroids, as gathered bi-weekly from hogs, sheep, and cattle at a Chicago packing house, showed the lowest iodine content in the spring and the highest iodine percentages in the fall. This variation appears to correspond quite closely with the green pasturage season, indicating that these animals regain their iodine supply in large measure in the grazing months and lose it to a considerable extent in the pastureless months of winter.

Seidell and Fenger also found that swine thyroid showed the least iodine on 17th March, the percentage at that time in the dry matter being 0.133; the highest iodine content was noted on 1st September, when the iodine ran 0.531 per cent. The iodine in the thyroid gland of the average slaughtered pig at the "maximum iodine season" would be about 10 milligrams (a milligram is 1-1000th of a gram, and a gram is 1-453rd of a pound) as contrasted with a little over 2 milligrams (1-226,796th of a pound, or 1 part out of 226,796 parts in a pound) of iodine in the "minimum iodine season." A little iodine does wonders and often makes the difference between life and death.

On the basis of the figures given, it appears that the iodine determinations bear out the statement of Smith to the effect that fetal anthyrosis is more likely in the early spring than later. Our experience in the corn belt has been that swine litters of the fall farrow are very much less likely to be affected with the hairless pig malady than are the litters of early spring, the ones that come before green, leafy vegetation is available.

That the iodine carried by plant materials varies according to the parts of the plant, and that a good many plants or plant materials apparently do not carry iodine in measurable quantities are facts.

The iodine content of feeds, even when grown under similar, though not identical, conditions, seems to vary greatly. Forbes and Beegle speak of "the haphazard nature of its distribution"; and also emphasise that "in most cases, at least, it must be strictly an accidental constituent." That there are great variations in the iodine content in the same grain crop grown in adjoining fields has been shown, and on the whole the evidence as gathered emphasises the rarity and accidental nature of iodine as a feed constituent, particularly in regions where much simple goitre is found.

Goitre due to low Iodine Content of Drinking Water.

Drs. McClendon and Hathaway, of the University of Minnesota, have shown that there is a remarkable coincidence between goitre occurrence and the low iodine content of the drinking water. In the northern portions of the United States, there are from 1 to 22 parts of iodine per hundred billion parts of water, whereas in the south the iodine runs as high as 18 to 470 parts (in Texas), with a good many sections showing over 160 parts. Iowa, which is in a semi-goitrous region, is represented by two water analyses, one from Ames (wells 75 to 100 feet deep), showing 1.2 parts, and one from Iowa City (Iowa River), with 1.5 parts to the hundred billion parts of water. It appears from this study that the water at Ames, Iowa, yields but little of the nutritional iodine. The average human thryroid, according to McClendon and Hathaway, carries approximately 40 milligrams (1/11,340th part of a pound) of iodine. Dr. Kendall told me once upon a time that there was about as much iodine in the rest of the normal body as in the normal thyroid; this would make a total of 80 milligrams, or 1/5,670th of a pound in the body, this being equivalent to about 1 part in a 1,000,000 parts in a 176-lb. man.

In Wisconsin the hairless pig malady has been experimentally observed in association with enlargement of the thyroid gland by Hart and Steenbock, who found that the malady could be avoided by feeding iodide to the brood sow. The absence of the necessary amount of iodine in the ration of the pregnant sows interfered markedly with the fetal development, but the effects were much more noticeable from the standpoint of the vitality of the offspring than of the sows. Although the sows that gave birth to the hairless pigs showed thyroids that were enlarged from a normal of less than an ounce up to over four ounces, yet the sows in large measure maintained their apparent well-being. On the other hand, there was heavy mortality among the pigs when they came hairless.

The widespread use of iodide in certain sections of the North-west, as my good friend and old college mate, Dr. Welch, puts it, "is as universal as the use of blackleg vaccine" in cattle-raising. Significant comment is made by this investigator concerning the prevalence of goitre in live stock in States other than Montana; in speaking of the loss of live stock from hairless pigs, goitred and hairless lambs, calves, and foals, he says: "Correspondence with stockmen here and there in Minnesota and Wisconsin and in other Eastern States show that the trouble is by no means confined to the North-west States."

The allowance of one grain of potassium iodide a day, which was experimentally administered, was apparently more than actually required, the experiments indicating that the iodine might be fed during a much shorter part of the pregnancy period than formerly, if allowed early and still be effective in preventing trouble. The practical stockmen have not welcomed the idea of feeding less iodide, inasmuch as the expense is relatively small and they are satisfied with the results obtained with one grain a day dosage.

Even where goitre was not a factor it was found that the addition of a small amount of iodine to the ration of the mother animal tended to increase the iodine content of the thyroid of the young with increased vigour and rate of development.

Minimum Field Requirement hard to Estimate.

The minimum field requirement or allowance of iodine during the pregnancy period is difficult to estimate, inasmuch as the natural intake in the feed and water varies so widely, so Welch tells us. In feeding the pregnant sow he has used a minimum dosage of one-half grain potassium iodide per sow daily during the first sixty days of the gestation period with success, and judging from experience unpublished it is his belief that one-tenth of a grain per day over the same period is ample. On the other hand, numerous cases have been observed in which one grain per sow daily for the last thirty or forty days of the period of pregnancy has not succeeded in preventing goitre; hence the suggestion that iodine feeding, to secure greatest efficacy, had best be done in the early part of the gestation period.

Dr. Kalkus gives data to show that the gestation period of animals is sometimes increased because of goitrous conditions. His investigations demonstrated that cows, mares, ewes, sows, and does were protected against giving birth to goitred new-born if tincture of iodine, which carries about 10 per cent. of iodine, was applied at frequent intervals to the skin.

Check experiments carried on by Dr. Kalkus with does, female goats, demonstrated that two grains of potassium iodide given daily, or one-quarter teaspoonful of tincture of iodine poured on the skin of the back weekly, during gestation, acted as marked preventives of goitre in the new-born. In another experiment, one-quarter teaspoonful of tincture of iodine poured on the skin, either weekly or every two weeks, resulted in normal offspring, whereas the check lot of does not receiving any applied or fed iodide showed some goitrous new-born.

This work in the State of Washington again demonstrated the possibility of absolutely controlling the development of goitre in new-born animals by the administration of iodine to the pregnant mother. Dr. Kalkus may be quoted in this respect: "These experiments were so highly successful that they solved our problem in goitrous districts, from a practical standpoint . . . . ."

Just how small a dosage of iodine is absolutely necessary to prevent goitre or hairlessness in pigs, new-born, has not yet been definitely determined, although the use of 1/50th to 1/25th of a pound of potassium iodide to a 100 lb. of mineral mixture as fed has proved O.K. under all conditions that we have studied.

Inasmuch as practically the whole northern half of the United States is a goitrous region, it would appear that the shortage of iodine is not necessarily restricted to certain localised areas. Furthermore, it would appear that even though the goitre is not manifest, nor recognised as such, there still may be a deficiency of iodine in the rations of the various farm animals.

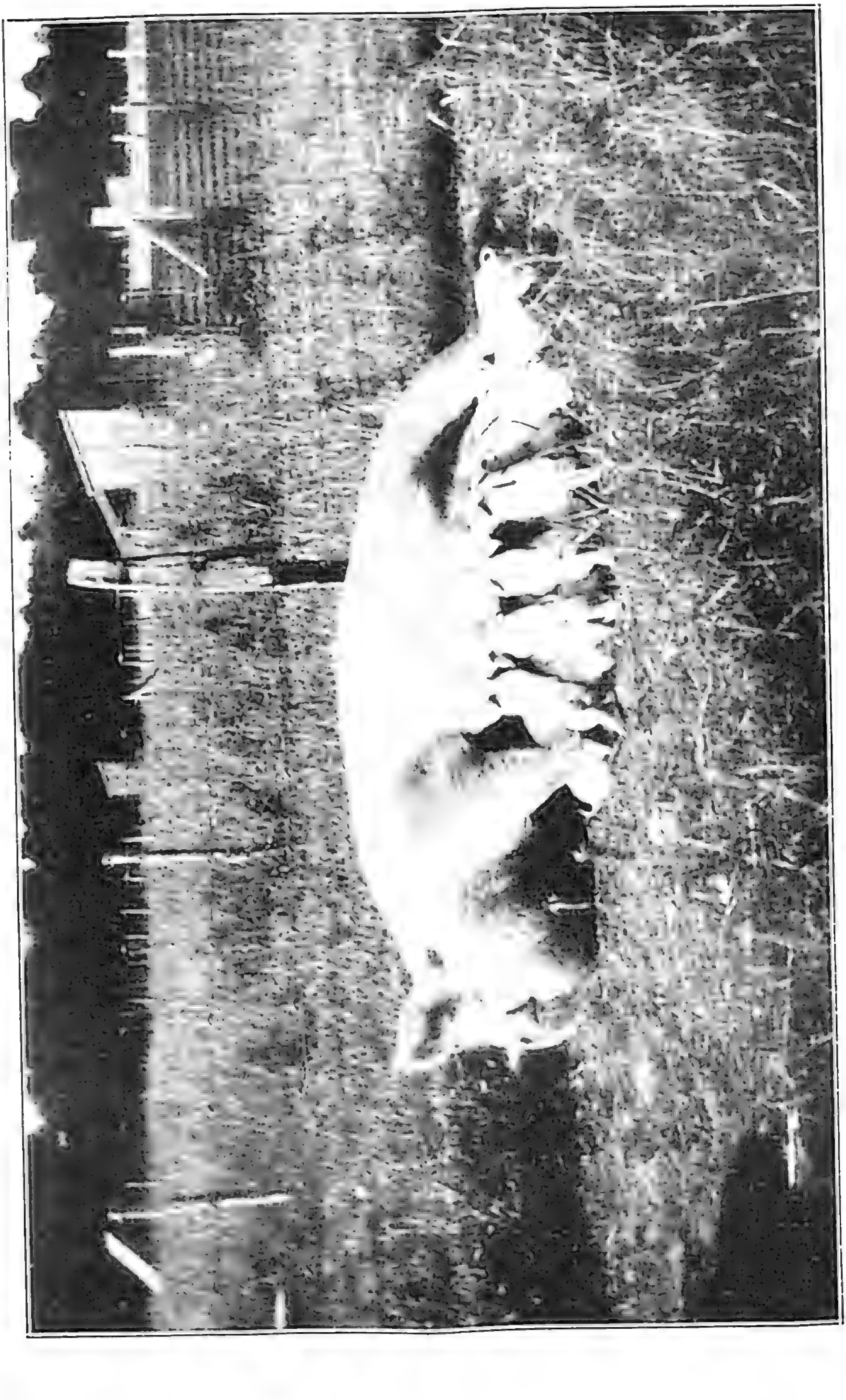


Plate 119.—A "Bandora" Gilt, with a Litter of 16 (13 raised).

MARKETING PIGS IN QUEENSLAND.—VI.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The marketing of his products is claiming much closer attention from the man on the land, and in this series Mr. Shelton describes how the farmers' pigs are handled at the selling end. In previous instalments several marketing systems with which Queenslanders are familiar were reviewed, and in the sixth article are many points of equal interest to the wide-awake pig-raiser. —Ed.

Of the eight bacon factories now operating in Queensland—viz., Foggitt Jones Ltd., Oxley; J. C. Hutton, Ltd.; Zillmere; the Queensland Co-operative Bacon Association, Ltd., Murarrie; the Darling Downs Co-operative Company, Ltd., at Willowburn; the North Queensland Co-operative Company, Ltd., at Floreat Siding, Mareeba (Atherton Tableland); the Warwick Bacon Company, at Warwick; Reeds, Ltd., at Maryborough; and Conaghan Bros., Ltd., at Rockhampton, the factory operating at Floreat Siding, Mareeba, is the most recently established.

North Queensland Co-operative Bacon Company.

This factory functions under the title of the North Queensland Co-operative Bacon Company, Ltd., and is truly co-operative in practice. It commenced operations in May, 1924, and for the first twelve months' run had a capital turnover of £25,020 5s. 5d. Extensions have already become necessary and the premises are being enlarged, which will give the factory the capacity to treat 450 pigs per week.

This company operates over the whole area included under the Atherton Tableland Pig Pool, which came into operation on 1st July, 1923. Prior to the inception of this pool the pig industry in the North was but poorly supported, and in general was in a very bad way; pigs were being sold for as low as 2d. per lb. in Mackay and Brisbane, and the prospects were anything but bright.

Both the compulsory pool and the recently established bacon factory have, however, saved the situation, and at date of writing (October, 1925) butchers throughout the area are buying porkers through the pool as chilled pork at 10¾d. per lb., while farmers are being paid 6½d. per lb. live weight for their pigs, which figure must not be confused with 8½d. per lb. for dressed or estimated dressed weight pigs, as paid by the Southern Queensland factories for prime bacon pigs at this time.

For the year ended 30th June, 1925, being the second year of the pool's operations, 6,934 pigs were handled by the pool, for which growers were paid the aggregate sum of £20,145 11s. 9d. The nominal capital of the company is £50,000, representing 50,000 shares of £1 each.

The annual report, as read at the annual general meeting of shareholders on Tuesday, 29th September, 1925, is an interesting and instructive document, from which the following excerpts have been made for the benefit of readers generally. This report represents the statement of accounts for the year ending 30th June, 1925, being the end of the third financial year of the company's operations.

Factory Operations.—For the year under review the company's turnover was £25,020 5s. 5d. The turnover in the chilled pork and hams and bacon department was £21,444 16s. 5d., while that in the smallgoods and hides and tallow department reached £3,575 9s. The quality of the goods being turned out by the factory is of such high standard that practically the whole of the goods are finding a ready market.

Factory Extensions.—The capacity of the factory when completed in May, 1924, was 150 pigs per week. Before the season was over it was found that, owing to the large number of pigs coming forward, in addition to the rapid growth of the smallgoods business, more space was required. The board therefore decided to increase the factory capacity to 450 pigs per week.

The Government has granted a further loan of £4,500 for the work, and £2,000 has been subscribed by shareholders. The total cost of the extensions is estimated at £7,000.

Pig Pool.—The board is giving effect to the motion passed at the last annual meeting, whereby it was agreed that the Pig Pool Board absorb the business and operations of the company.

Share Capital.—During the year 2,060 new shares have been allotted, making a total of 15,421 shares subscribed to 30th June, 1925.

Profits.—After writing off depreciation to the extent of £500 10s. and writing £191 4s. 2d. off preliminary expenses, there is a profit of £635 16s. 8d.

The board recommends the payment of a dividend of 5 per cent. upon capital paid up to 30th June, 1925. This will absorb approximately £620, and the balance will be carried forward in the Appropriation Account.

Pig Pools.

The whole subject of pig pools will be dealt with more fully in future articles, sufficient to say here that the subject-matter is one that has recently received very careful attention at the hands of a special committee of investigation sitting at the Council of Agriculture, Brisbane. It is understood that the report of this committee is to be published for the benefit of interested producers.

Certain it is that, as far as North Queensland is concerned, the Pig Pool and the bacon factory has put new life into the industry and has placed it on a sound financial basis, but it must be remembered that they are in one sense an isolated community trading over an area that so far has not been affected by the Southern markets. Pig-raisers in Central and Southern Queensland are much nearer the

PLATE 120.—THE NORTH QUEENSLAND CO-OPERATIVE BACON FACTORY AT FLOREAT SIDING, NEAR MAREEBA, ATHERTON TABLELAND.

markets of the Greater Brisbane and metropolitan area and the markets of New South Wales, Victoria, &c., and this fact alone places several serious obstacles in the way of the formation and functioning of any pooling system in Southern Queensland.

The progress of the North Queensland pooling system is being watched very closely by pig-raisers throughout the Commonwealth, for some very excellent work is being done there and some remarkably good results are being obtained.

The bacon factory at Floreat Siding, Mareeba, is not actually situated upon the Atherton Tableland, but is within a few miles by rail of all the principal pig-raising centres there, and is thus centrally situated in a much drier and less humid atmosphere than is common on the higher altitudes on the Tableland. This factory is situate practically 1,000 miles due north of Brisbane, and is now connected by rail *viâ* Cairns with all the centres on the Great Northern Railway system of Queensland as well as through that system with the markets of the South, but they are finding abundant outlet for the sales of all their goods locally, and thus do not at present cater for Southern markets. As they are almost 2,000 miles nearer the markets of

PLATE 121.—PACKING FLOOR J. C. HUTTON'S PROPRIETARY, LTD., BACON FACTORY, ZILLMERE.

the northern parts of Australia, New Guinea, and the markets *viâ* that route to the East, it is doubtful if they will for many years to come have any appreciable influence on Southern markets. Distance again largely prevents the Southern manufacturers catering for the North, nor does the pooling system encourage such. With it all, however, they occupy an influential position, and their success will mean much to the pig-raisers in other parts of Queensland and the Commonwealth.

The Darling Downs Co-Operative Bacon Co., Ltd.

Pig-raisers on the extensive area of agricultural country generally referred to as the Darling Downs and lying north, south, east, and west of Warwick and Toowoomba, the two principal railway centres on the main north-south railway system of Queensland, are provided for largely by the Darling Downs Co-operative Bacon Co., Ltd., with an extensive factory and plant at Willowburn, near Toowoomba. The following extracts from the twenty-third annual report presented to shareholders at the annual general meeting held at Toowoomba on Friday, 27th March, 1925, are interesting:—

Supplies.—During 1924 the pigs received at the factory totalled 35,989, or 3,302 less than last year. Had it not been for a fire the number of pigs sent in would easily have been a record, as 14,584 came along up to 30th June and 21,405 in the second half of the year: the weekly average during the first half of 1924 was 561, and during the second half 823, or a weekly average over the whole year of 692. The amount paid for these pigs with advance notes amounted to £133,394 11s. 8d., of which £94,278 2s. 5d. was paid to shareholders and £39,116 9s. 3d. to non-shareholders. It was decided to distribute a final payment to shareholders at the rate of 15 per cent. on the amounts already paid them for their pork, and £14,145 11s. 3d. was absorbed thereby. The total cost of pigs therefore amounted to £147,540 2s. 11d. It had been hoped that this year the factory would have been able to pay the amount of deferred payment to suppliers in actual cash, but after very careful deliberation it was decided that this would not be the wisest course to adopt. The factory decided, therefore, that for this year, at any rate, the distribution must be made in shares. The rapid growth of the business of the company will make it necessary for fairly large sums to be spent for the erection of further necessary buildings and extensions in the very near future. The solid grain which has been available for feeding purposes during the year caused many suppliers to misjudge the weight of their pigs and to hold them rather too long in the pens, with the result that they were on the heavy side when sent in. This adversely affected the price; but the price paid for every pig has been strictly in accordance with the schedules sent to agents from time to time. The actual weighing of every pig is carefully carried out. The absolute necessity of supplying pigs of just the right weights, which range from 95 lb. to 125 lb., was stressed.

Turnover.—Total sales in all departments for the year reached £143,889 5s. 6d., including sales of canned products, £15,682 15s. 10d., and pigs from the piggery, £1,121 13s. 3d. Sales of canned products are increasing very quickly.

Piggeries.—A large number of pigs passed through the piggeries, the big majority being received in the early half of the year, when the factory was out of action and prices were falling rapidly.

Stocks.—The value of stocks on hand and with various agents—General, £33,761 10s. 3d.; cannery, £3,366 2s.; and piggery, £526 3s. 8d.—was calculated with every care and on a conservative basis.

Share Capital.—The total capital paid up as at 31st December, 1924, was £47,336 15s. 2d. Seven hundred and fifty-four shares were allotted during the year, and the number of shares issued to the end of the period was 47,955.

Other Outlets for Downs Pig Raisers.

Other outlets for pigs produced on the Darling Downs and neighbouring districts are found in the Warwick Bacon Company, with a factory at Warwick, and direct trucking to the co-operative factory at Murarrie; Foggitt Jones Ltd., at Oxley; and J. C. Hutton, Ltd., at Zillmere.

The pig sales which are held regularly at Harristown, a suburb of Toowoomba, also provide an excellent outlet for many hundreds of store pigs and porkers during each year. It is at these saleyards that the proprietary buyers put their purchases "over the scales" prior to issuing receipt form, which is negotiable for cash on delivery at the company's bank. Buyers also occasionally visit the Downs from both the South and the North, this usually in search of good lines of store pigs for further fattening.

PICKLING WHEAT WITH CARBONATE OF COPPER.

H. C. QUODLING, Director of Agriculture.

Bunt or Stinking Smut, sometimes called "Ball Smut" to distinguish it from "Loose or Flying Smut," is the cause through its prevalence in the field and in harvested grain of a good deal of loss to wheatgrowers, which can be obviated by pickling all seed wheat prior to sowing.

Carbonate of copper, used by this Department for some years, has proved itself to be fully effective, and has much to recommend it for general use.

Points in Favour of the Process.

The germinating quality of the grain is not impaired, and the young plant is not subjected to the injury associated with the use of Bluestone (copper sulphate).

It obviates wetting the grain.

Less labour is required in the dry process of pickling.

Better yields are obtained.

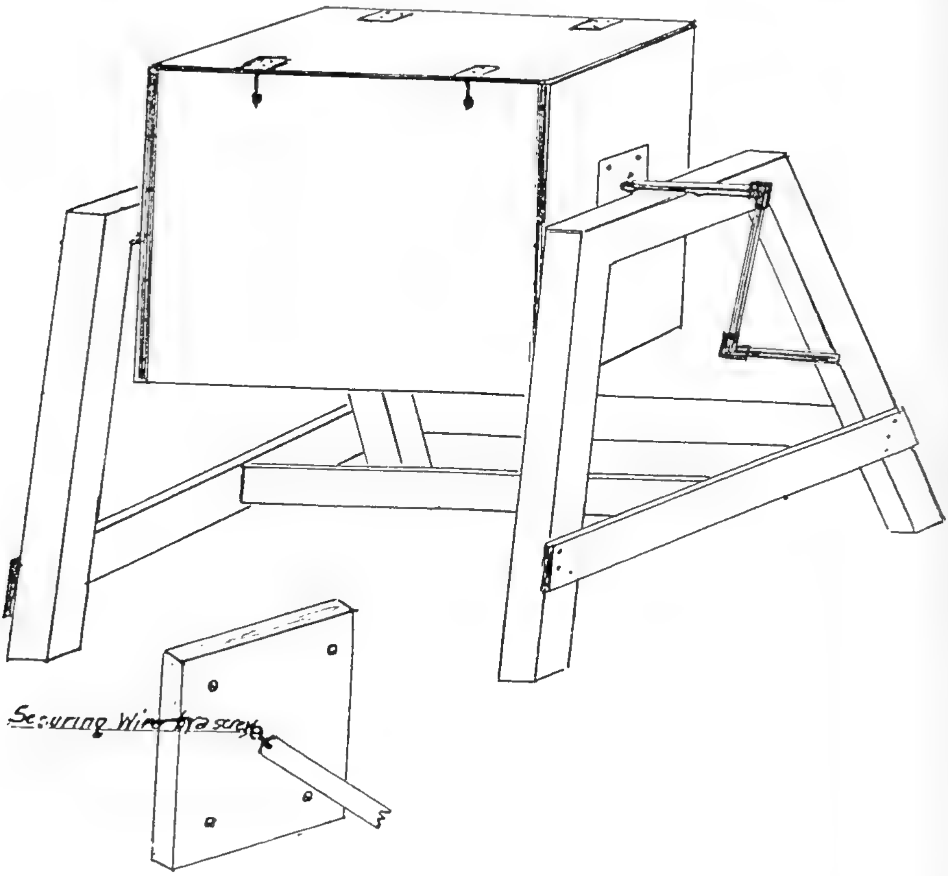
At harvest time, grain free from smut is assured.

The cost of the chemical works out at a fraction under a penny per bushel.

Grain may be treated, if necessary, several weeks before sowing.

Bunt or Stinking Smut.

This is caused by a fungus the spores of which, found commonly in the "crease" or in the "brush" of a grain of wheat, germinate about the same time as the grain itself germinates. In this way the fungus enters the tissues of the young wheat plant and ultimately finds its way into the ear, where the sooty-coloured mass of spores takes the place of the grain, giving rise to the name it commonly goes under, "Ball Smut."



The number of individual spores or seeds of the fungus found in one ball of smut is sufficient, theoretically, to infect all the grain in a three-bushel bag of wheat.

Individual spores are so minute as to escape detection. Obviously, the only way to ensure a clean sample of grain at harvest time is to pickle all seed wheat, irrespective of the fact that it may appear to be quite free from smut, even when a very close inspection is made. If smut balls are observed in the seed wheat (and their presence in wheat for sowing is to be avoided whenever possible), they should be removed by pouring the grain into a tubful of strong brine to permit of skimming off the balls of smut, which readily float; the grain then being spread out to dry on a tarpaulin, prior to treatment with carbonate of copper.

Method of Pickling.

Use ¾ oz. of copper carbonate for each bushel of grain; slightly less—say, ½ oz. per bushel—is sufficient where a suitable wheat pickling contrivance is used, but the use of the smaller quantity of copper carbonate is only recommended when the seed is known to be practically free from smut.

In the "Petrol Case Wheat Pickler" only half a bushel of seed wheat should be pickled at one operation. For rapid work, use a suitable measure both for the grain and the copper carbonate.

To pickle seed wheat and thoroughly blend the chemical with the grain, revolve the pickling box, say, twenty times, and then empty out and bag the grain direct from it.

Note.—Copper carbonate should not be put into the seed box of the drill in an attempt to mix it there, the fine dust shakes down, clogs up and will break the cog wheels.

The Petrol Case Seed Wheat Pickler.

Select a petrol case which has been constructed from sound timber and carefully remove the top, which is to be used as the lid. On the under side of the lid fit and nail two cross pieces 2 in. by ½ in., 2 in. from each end. Attach one pair of 1½ in. butt hinges, also two japanned hasps to fit tightly over D's, as shown in sketch.

Tack double strips of thick flannel on the under side of the lid where it comes in contact with the edges of the box, so that when it is closed, the joint between the lid and box will be quite dust-proof.

Strengthen the box by means of two bands of hoop iron fastened on the outside edges. Draw two diagonal lines on each end of the box and bore holes at the intersections to admit of the spindle passing right through the box. Prepare two pine blocks about 3 in. square out of ¾-in. material; these are to strengthen the ends of the box and allow for securing the spindle firmly in position to permit of rotating the box.

Bore both blocks with a similar sized auger bit to that used for boring the ends of the box. Place the blocks so that the grain of the wood is at right angles to that of the box and secure with four wood screws in each. Procure a piece of ¾-in. galvanized iron piping long enough to act as a spindle, one end of which should be threaded to carry a ¾-in. elbow. For the crank, procure two pieces of ¾-in. piping, each 9 in. in length; one will require threading at each end, whilst the other will only require threading at one end for the necessary elbow.

The method of attaching the spindle to the box is shown in the sketch.

Two holes are bored in the spindle the exact length of the box apart. Two pieces of No. 8 wire of the same diameter as the holes are driven through the spindle and secured to the wooden blocks either by driving staples over the wire, or what is a stronger and more effective job, bending the wire to form an eye and securing it in position with a screw.

The framework of the machine presents no difficulties, and may be constructed from 3 by 2 and 3 by 1 hardwood, but sufficient height must be allowed underneath to permit of the contents of the box being emptied directly into a bag.

Note.—Carbonate of copper forms the principal part of a number of proprietary compounds already on the market for pickling wheat.

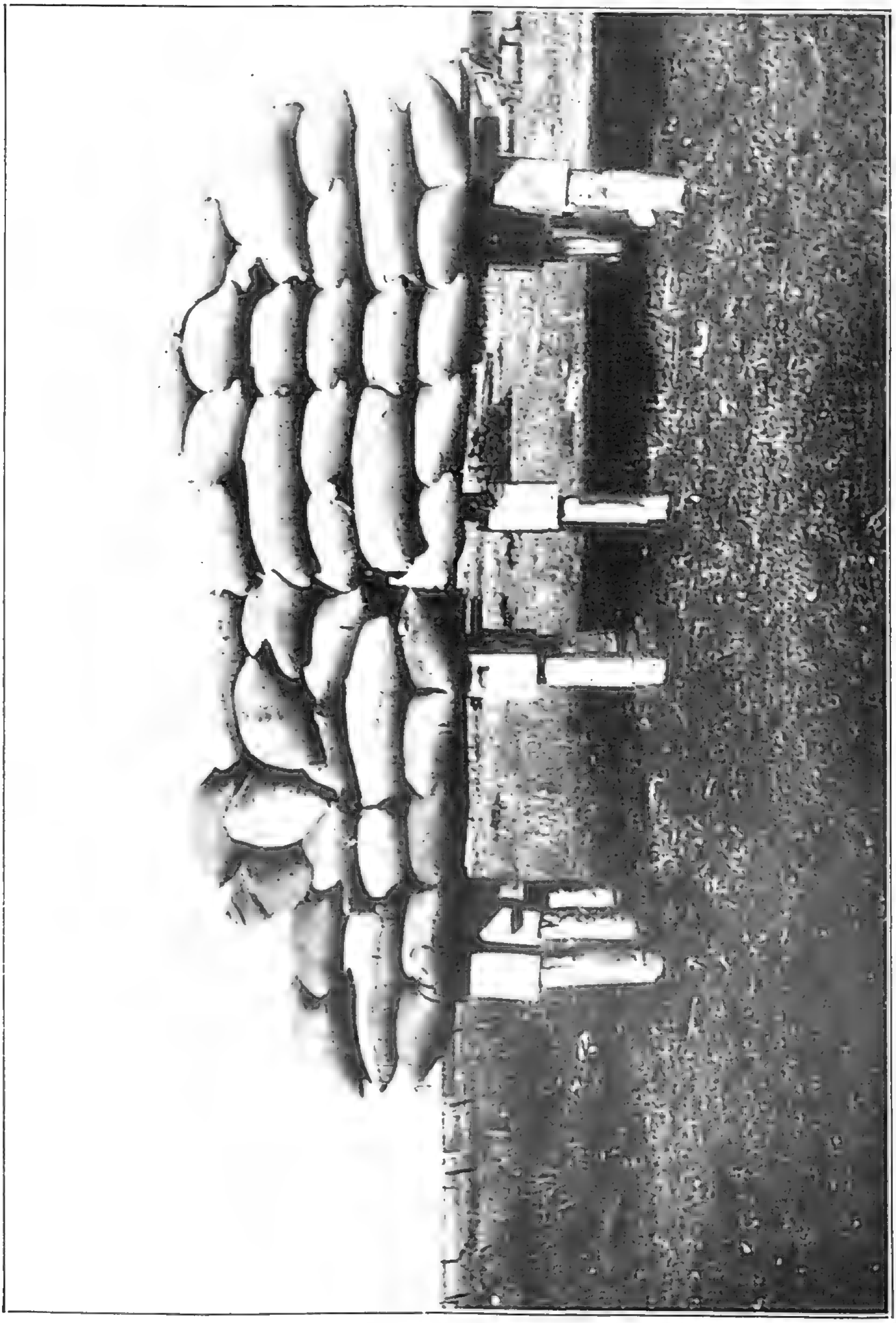


PLATE 122. A COMMON SIGHT ON THE DOWNS.—MOUSE-PROOF DUMP OF SEED WHEAT ON GETZ BROS. FARM, ALLORA.

Answers to Correspondents.

Overfat Sow.

J.F.T. (Marlborough)—

Reference to Berkshire sow which has failed to breed successfully: In all probability you have this sow over fat, and the boar may also be in a similar condition. Reduce her condition by compelling her to hunt for part of her living in a good grass paddock, where also you might supply her with green food such as lucerne, saccaline, cow cane, sweet potatoes, and pumpkins. Cut the grain ration down to a minimum, and do not allow as much milk food as at present. Our Veterinary Officers are of opinion that many of these troubles are caused through the sow becoming injured at farrowing time, this especially so if the sow is over fat at this time. Very fat sows frequently fail to recover properly after farrowing, the result being that septic inflammation (metritis) is set up which tends to make them shy breeders if not altogether sterile. This indicates the necessity of keeping sows as well as the boar in medium breeding condition only (not fat). The sow also should be mated as soon as she has weaned her litter—*i.e.*, at about nine weeks after farrowing—and it is not advisable to allow the sow to run with the boar except at mating time. Sows should not be mated in the first instance before they are ten months old, nor should the boar be used earlier than this. It is suggested that you try syringing the uterus with a solution of one teaspoonful of table salt in one pint of sterile water; water which has been boiled and allowed to cool down to blood heat is best for this purpose. Mr. Veterinary Surgeon Rudd states that this has been tried, and has been effective in 80 per cent. of cases. If this does not give satisfactory result, try twenty grains of permanganate of potash in one pint of water at blood heat, and follow up with the saline solution every day for three consecutive days before service. It is also advisable to give the sow a course of purgative medicine like two or three ounce doses of Epsom salts, either as a drench or in her food. It is an advantage, if at all possible, to change the boar, using a young vigorous boar, but in every case keep the stock in medium breeding condition and do not feed too heavily on grain, particularly during the spring and summer months when green food is usually available in good quantity.

HINTS TO DAIRYMEN.

J. DAVIES, Inspector of Dairies.

Wash your own hands before starting to milk and after milking each cow; also wash each cow's udder with clean cold water with just enough Condy's crystals added to colour the water.

Use plenty of lime around the bails and dairy.

Do not spill milk about the bails and dairy.

Keep each separation of cream separate until conveyed to the factory. You cannot stir it too often. Do not mix fresh cream with stale; it pays to send the fresh cream in a separate container. (The mixing of fresh with stale cream results in second and third grade tests.)

Flush the separator with warm water—not skim milk, which appears to be the general practice.

During the summer months, October to March, never separate below 38 per cent., preferably around 40 per cent. The winter months, 35 per cent. to 38 per cent.

Cream should be delivered at least three times weekly, and should not be held for a longer period.

Do not leave cream exposed to the sun's rays. Place a clean wet bag around the can when going to the railway station or factory by road. Always open your cans on return.

Wash your dairy utensils first with warm water and soda and then immerse them for five minutes in boiling water. Allow to drain and dry.

Do not put your cream in a can until it has been thoroughly scalded and rinsed with clean rain water. *Never use creek or dam water,* unless it is quite unavoidable.

The use of a cream cooler is most important, for it not only helps to cool the cream quicker, but also takes away a good deal of the weed taints.

Do not grudge the time you spend in your dairy and bails. The more care you take in the handling of cream the better your factory return and the dairying industry generally.

EGG-LAYING COMPETITIONS.

MOUNT GRAVATT.

In September 5,619 eggs were laid, an average of 20·8 eggs per bird. Although this is not up to last year's figures, the yield can be considered satisfactory. Four deaths occurred in Section 2, otherwise the general health has been satisfactory. Individual scores :—

SECTION 1.

White Leghorns.

Name.	A.	B.	C.	D.	E.	F.	Total.
W. and G. W. Hindes	134	130	130	136	136	146	812U
W. E. Woodward	123	129	134	112	131	107	736
Mrs. R. E. Hodge	123	122	116	140	103	118	722U
John J. McLachlan	115	131	124	113	133	95	711
Eclipse Poultry Farm	138	126	107	121	118	92	702
B. Driver	126	101	91	119	121	128	686
E. J. Stilton	115	117	114	132	130	74	682
M. F. Marsden	106	116	107	98	117	127	671
S. L. Grenier	136	127	137	68	95	102	665
H. Fraser	73	121	126	124	118	96	658U
R. C. J. Turner	115	106	114	124	83	112	654
Jas. Earl	110	124	80	117	99	117	647U
J. Harrington	80	105	95	130	114	122	646
W. Wakefield	122	131	94	113	104	73	637
Jas. Hutton	113	101	134	85	86	109	628U
Geo. Marks	82	120	101	97	128	99	627
N. F. Newberry	77	107	134	115	100	91	624
H. P. Clarke	90	120	85	103	87	119	604U
T. H. Craig	85	117	101	100	92	106	601
J. E. G. Purnell	109	81	109	125	104	70	598
L. Bird	115	84	88	86	138	84	595U
Mrs. C. E. Lindley	97	76	96	123	102	101	595U
E. Anderson	56	90	90	97	126	129	588U
G. W. Cox	72	88	121	116	106	85	588
Mrs. H. P. Clarke	77	120	98	92	118	70	575
Chris. A. Goos	126	69	89	107	74	107	572
A. S. Walters	106	97	83	98	58	118	560
T. W. Honeywell	87	2	117	99	104	87	496
W. D. Melrose	122	103	39	9	105	15	393

SECTION 2.

Black Orpingtons (except where stated).

Name.	A.	B.	C.	D.	E.	F.	Total.
H. Cutcliffe	153	109	123	108	135	127	755U
Eclipse Poultry Farm	129	112	126	138	118	130	753U
E. W. Ward	126	112	125	118	125	110	716
Mrs. A. E. Gallagher	125	114	128	88	111	134	700U
Jas. Potter	137	110	108	106	111	123	695
Geo. E. Rodgers	114	134	127	95	123	80	673
W. and G. W. Hindes	148	83	97	82	111	132	653
Carinya Poultry Farm	119	118	69	89	123	104	622
J. Pryde (R. I. Reds)	98	97	79	120	101	111	606
Thos. Hindley	140	77	116	81	114	72	600
R. Burns	111	84	99	111	105	83	593
W. D. Melrose	19	105	120	132	116	81	573
C. Dennis	103	95	129	108	53	74	562
E. Walters	57	62	101	103	111	97	531
Jas. Hutton	104	94	83	64	48	94	487
E. C. Stead	30	53	77	78	72	67	377U

"U" indicates that the pens have failed to average the standard weight of 24 ounces to the dozen eggs.

MOUNT GRAVATT—*continued.*

Following are weights of eggs laid by individual birds competing in this test, and also the average weight per dozen for the group.

SECTION 1.

White Leghons.

Owner.	Birds.						Average per Dozen.
	A.	B.	C.	D.	E.	F.	
W. and G. W. Hinds	1·98	2·06	2·00	1·92	2·10	1·83	23·78
J. J. McLachlan	2·06	2·22	1·97	2·10	2·08	1·88	24·62
George Marks	2 22	2·21	2·13	2·13	2·08	2.13	25·80
Mrs. R. E. Hodge	1·92	2·02	2·05	1·94	1·82	1·85	23·20
T. W. Honeywill	1·82	..	2·12	2·00	2·05	2·29	24·84
Mrs. C. Lindley	1·97	2·00	2·00	2·00	1·97	2·00	23·88
T. H. Craig	1·82	1·77	2·28	2·01	1·90	2·40	24·36
W. D. Melrose	2·50	1·78	1.79	..	2·22	..	24·84
E. J. Stilton	1·98	2·10	2·10	2·02	2·04	2·00	24·48
S. L. Grenier	2·25	2·15	2·29	2·07	2·15	2·02	25·86
G. W. Cox	1·80	2·15	2·01	2·06	2·03	2·03	24·16
H. Fraser	2·10	1·82	2·14	2·10	1·78	2·00	23·88
W. Wakefield	2·05	2·12	2·08	1·80	2·97	2·00	24·44
M. F. Marsden	2·04	2·10	2·20	2·37	2·00	2·00	25·62
J. Harrington	2·06	2·00	2·15	2·00	1·98	1·95	24·28
Jas. Hutton	2·07	1·77	2·05	2·06	1·92	2·00	23·64
J. E. G. Parnell	1·94	1·95	2·15	2·05	2·02	1·95	24·12
M. F. Newberry	2·03	2·05	1·95	2·27	2·07	2·22	25·18
W. E. Woodward	2·10	2·02	2·02	2·22	2·05	2·05	24·92
Jas. Earl	1·68	2·05	2·02	2·11	2·10	1·78	23·48
H. P. Clarke	1·88	1·96	2·02	2·02	2·20	1·70	23·56
R. C. J. Turner	2·08	2·07	1·65	2·27	2·18	2·00	24·50
Chris. A. Goos	1·85	2·17	2·10	1·80	2·00	2·10	24·04
L. Bird	2·00	..	1·58	2·08	1·88	1·83	22·28
Mrs. H. P. Clarke	1·95	2·00	2·02	2·00	2·07	2·07	24·22
E. Anderson	1·90	1·90	2·22	1·80	1·78	1·98	23·16
A. S. Walters	2·00	2·00	2·02	1·98	2·05	2·03	24·16
B. Driver	2·20	2·00	1·92	1·90	2·17	1·84	24·06
Eclipse Poultry Farm	1·82	2·27	2·02	2·05	2·17	2·00	24·66

SECTION 2.

Heavy Breeds.

Owner.	Birds.						Average per Dozen.
	A.	B.	C.	D.	E.	F.	
Eclipse Poultry Parm	1·93	2·01	2·00	2·03	1·87	1·87	23·42
Carinya Poultry Farm	2·00	2·05	1·95	2·02	1·98	2·07	24·14
H. Cutcliffe	1·60	2·15	1·65	2·07	1·98	1·84	22·58
W. D. Melrose	2·20	2·00	1·95	1·90	2·04	2·12	24·42
Thomas Hindley	1·78	2·19	2·17	2·02	1·98	2·14	24·56
Jas. Potter	1·75	2·12	2·00	2·19	1·94	2·00	24·00
Jas. Hutton	2·30	2·27	2·20	..	2·17	2·35	27·12
R. Burns	2·35	2·25	2·20	2·02	2·00	2·00	25·68
W. and G. W. Hindes	2·00	2·22	2·08	2·03	2·03	2·04	24·80
E. W. Ward	2·05	2·07	2·13	1·88	1·95	2·08	24·32
E. Walters	1·92	2·27	2·02	2·08	1·85	1·88	24·04
Mrs. A. E. Gallagher	1·63	2·13	2·00	2·00	1·80	2·17	23·46
G. E. Rodgers	2·05	1·75	2·08	2·25	1·78	2·11	24·04
C. Dennis	2·08	2·02	2·00	2·08	2·22	2·02	24·84
E. C. Stead	2·05	1·88	1·78	1·60	1·93	1·94	22·36
J. Pryde	2·13	2·20	2·25	2·27	2·12	?·15	26·24

N.U.P.B.A. TOOWOOMBA SUB-BRANCH.

Single Test Egg-Laying Competition—Scores to 30th September, 1925.

WHITE LEGHORNS.

Pen No.	Name.	Sept.	Total.
52	R. B. Howard	18	132
42	D. H. Dipple	18	131
41	D. H. Dipple	19	125
39	R. C. Cole	23	125
8	H. S. Wagner	19	121
9	A. C. Horne	17	118
40	R. C. Cole	10	116
50	C. A. Keen	17	116
21	G. E. Rogers	21	114
33	H. J. Manning	19	113
29	J. H. Jones	19	110
32	J. Newport	20	106
27	J. W. Short	16	105
28	J. W. Short	15	105
19	H. Dibbs	15	102
49	C. A. Keen	17	101
30	J. H. Jones	21	100
11	Jas. Hutton	18	100
54	E. W. Howe	19	99
38	P. J. Fallon	16	97
60	M. Murphy	13	95
26	W. G. Harper	22	95
51	R. B. Howard	14	93
35	R. C. J. Turner	11	91
56	J. F. Dahlheimer	13	88
2	Jas. Taylor	20	87
61	J. Goggins	14	86
3	E. Parker	19	84
48	G. Stilton	14	83
1	Jas. Taylor	10	83
59	M. Murphy	12	80
46	M. J. Frawley	5	80
17	W. D. Williams	12	77
62	J. Goggins	9	77
20	H. Dibbs	13	75
37	P. J. Fallon	13	72
45	M. J. Frawley	7	71
13	J. E. King	7	70
25	W. G. Harper	20	69
10	A. C. Horne	15	68
5	G. Maurer	18	65
44	S. V. B. Sharkey	0	63
6	G. Maurer	13	61
4	E. Parker	12	61
22	G. E. Rogers	0	60
12	Jas. Hutton	15	58
55	J. F. Dahlheimer	10	53
43	S. V. B. Sharkey (replaced)	15	22
53	E. W. Howe	*18	119
57	S. Chapman	*20	113
14	J. E. King	*19	104
7	H. S. Wagner	*17	102
23	Everlay P. Farm	*12	101
58	S. Chapman	*7	101
24	Everlay P. Farm	*20	75
36	R. C. J. Turner	*13	69
15	W. Grant	*16	69
16	W. Grant	*18	68
47	G. Stilton	*6	50
18	W. D. Williams	*11	45
34	H. J. Manning	*15	44
31	J. Newport	*20	35

OTHER VARIETIES.

Pen No.	Name.	Sept.	Total.
71	H. Dibbs (Lang.)	16	121
75	— Badcock (R.I.R.)	19	103
64	S. Chapman (B.L.)	12	95
65	Mrs. K. O'Connor (B.L.)	22	85
73	A. W. Le Pla (R.I.R.)	21	82
69	— Badcock (Lang.)	20	81
68	E. Parker (B.L.)	23	70
72	H. Dibbs (Lang.)	8	60
70	— Badcock (Lang.)	11	56
67	E. Parker (B.L.)	16	50
81	V. Brand (B.L.)	16	49
74	A. W. Le Pla (R.I.R.)	5	48
80	Everlay P. Farm (W. W'dotte)	*14	103
82	V. Brand (B.L.)	*19	98
77	L. Maund (Col. W'dotte)	*13	93
66	Mrs. K. O'Connor (B.L.)	*22	91
79	Everlay P. Farm (W. W'dotte)	*11	75
63	S. Chapman (B.L.)	*4	69
76	— Badcock (R.I.R.)	*10	63
78	L. Maund (Col. W'dotte)	*4	59

BLACK ORPINGTONS.

Pen No.	Name.	Sept.	Total.
120	Jas. Hutton	10	135
99	A. R. Petty	24	133
89	A. W. Le Pla	16	132
117	T. Hindley	10	130
132	G. E. Rogers	21	128
105	L. Maund	9	124
119	Jas. Hutton	23	123
121	E. W. Brock	14	122
128	J. W. Short	8	121
107	C. Graham	12	112
106	L. Maund	13	112
96	R. Burns	23	110
97	V. J. Rye	13	107
100	A. R. Petty	11	105
118	T. Hindley	20	104
114	D. W. Williams	18	103
111	E. Walters	19	101
126	H. B. Stephens	16	97
98	V. J. Rye	7	97
88	J. Head	15	95
90	A. W. Le Pla	16	93
109	S. McBean	13	91
86	— Kelly	19	86
102	T. J. Carr	8	85
85	— Kelly	4	85
108	C. Graham	10	83

* Signifies bird laying under-weight eggs.

N.U.P.B.A. TOOWOOMBA SUB-BRANCH—*continued.*

BLACK ORPINGTONS—*continued.*

Pen No.	Name.	Sept.	Total.	Pen No.	Name.	Sept.	Total.
112	E. Walters	6	80	131	G. E. Rogers (replaced)	5	5
84	W. R. Wilson ..	14	76	130	R. Neil	*25	144
113	D. W. Williams ..	9	75	127	J. W. Short ..	*22	125
83	W. R. Wilson ..	17	75	116	Everlay P. Farm ..	*12	119
103	W. S. Adams ..	13	72	124	P. Hopkins	*12	90
95	R. Burns (dead) ..	—	71	94	T. C. Ollier ..	*17	73
123	P. Hopkins	4	70	91	K. Macfarlane ..	*11	70
92	K. Macfarlane ..	14	67	129	R. Neil	*5	64
115	Everlay P. Farm ..	10	63	104	W. S. Adams ..	*17	64
110	S. McBean	11	58	101	T. J. Carr ..	*10	51
122	E. W. Brock ..	8	58	93	T. C. Ollier ..	*5	47
87	J. Head	8	46				
125	H. P. Stephens ..	2	44				

* Signifies bird laying under-weight eggs.

JOSEPH GARNER, Government Supervisor.

N.U.P.B.A. ZILLMERE

The average production for September was 20.2 eggs per bird, sectional results being—White Leghorns 21.4, Black Orpingtons 19.0, and Other Varieties 17.3.

One death occurred—No. 73, White Leghorn—and Nos. 163 and 5 were withdrawn owing to sickness. Otherwise the health of the birds has been satisfactory.

WHITE LEGHORNS.

Pen No.	Name.	Sept.	Total.	Pen No.	Name.	Sept.	Total.
82	G. W. Cox	27	157	99	A. Anderson ..	10	105
35	S. L. Grenier ..	23	151	47	G. E. Rogers ..	21	105
8	R. G. Cole	24	150	33	W. E. Woodward ..	20	105
27	J. J. McLachlan ..	26	146	41	S. A. Chapman ..	23	103
95	S. A. Doman ..	24	146	11	J. Fordyce ..	17	101
86	H. T. Pember ..	21	146	40	S. A. Chapman ..	21	101
81	R. Marshall ..	23	142	70	S. Lloyd	21	101
39	R. Duff	25	133	12	J. Fordyce	16	99
85	H. T. Pember ..	21	131	16	J. T. Webster ..	19	99
79	R. Marshall ..	18	128	29	M. F. Newberry ..	26	97
65	A. S. Walters ..	22	127	52	E. C. Raymond ..	22	94
15	R. C. J. Turner ..	25	126	22	H. Pearce	22	93
36	S. L. Grenier ..	23	125	21	J. L. Chapman ..	20	90
92	C. Quesnell ..	17	125	1	J. Earl	22	90
45	J. R. Wilson ..	25	122	77	A. Hodge	19	90
43	J. R. Wilson ..	25	122	89	R. H. Woodcock ..	23	90
19	J. L. Chapman ..	22	122	48	G. E. Rogers ..	22	89
78	A. Hodge	23	122	38	R. Duff	18	89
59	J. Hutton	24	121	61	W. Wakefield ..	25	89
17	J. T. Webster ..	22	120	3	J. Earl	26	88
83	G. W. Cox	22	119	62	W. Wakefield ..	26	87
14	R. C. J. Turner ..	25	119	7	R. C. Cole	22	86
51	F. J. Williams ..	25	117	80	R. Marshall ..	21	85
53	E. C. Raymond ..	19	116	69	W. H. Forsyth ..	19	84
10	J. Fordyce ..	22	116	75	J. E. G. Purnell ..	23	84
6	W. J. Berry	25	116	98	A. Anderson ..	22	82
67	W. H. Forsyth ..	23	115	58	J. Hutton	25	81
42	S. A. Chapman ..	21	114	24	H. Pearce	2	81
96	S. A. Doman ..	29	114	25	M. F. Newberry ..	22	79
16	J. T. Webster ..	25	111	71	S. Lloyd	22	76
23	H. Pearce	25	110	2	J. Earl	27	75
13	R. C. J. Turner ..	24	108	20	S. L. Chapman ..	13	75
50	F. J. Williams ..	24	107	34	S. L. Grenier ..	26	73
84	G. W. Cox	23	106	54	E. C. Raymond ..	15	70

N.U.P.B.A. ZILLMERE—*continued.*

WHITE LEGHORNS—*continued.*

Pen No.	Name.	Sept.	Total.	Pen No.	Name.	Sept.	Total.
49	F. J. Williams ..	5	58	66	A. S. Walters ..	24	U142
91	C. Quesnell	20	58	46	G. E. Rogers ..	22	U138
72	S. Lloyd	20	52	60	J. Hutton	19	U136
97	A. Anderson (replaced 26-6-25)	18	51	90	R. H. Woodcock ..	21	U134
37	R. Duff (replaced 18-8-25) ..	20	28	57	J. P. Marshman ..	19	U126
73	J. E. G. Purnell (replaced 14-9-25)	11	11	9	R. C. Cole	18	U122
25	J. J. McLachlan ..	22	U166	76	A. Hodge	17	U118
87	H. T. Pember ..	25	U160	94	S. A. Doman ..	21	U118
26	J. J. McLachlan ..	25	U157	55	J. P. Marshman ..	25	U115
31	W. E. Woodward ..	25	U157	32	W. E. Woodward ..	25	U113
30	M. F. Newberry ..	25	U155	88	R. H. Woodcock ..	25	U112
64	A. S. Walters ..	24	U155	4	W. J. Berry ..	20	U108
44	J. R. Wilson ..	23	U145	68	W. H. Forsyth ..	26	U108
				93	C. Quesnell	17	U105
				74	J. E. G. Purnell ..	28	U104
				63	W. Wakefield ..	23	U80

BLACK ORPINGTONS.

122	W. H. West ..	23	156	135	R. Burns	22	87
110	G. E. Rogers ..	20	154	134	R. Burns	9	86
102	J. Hutton	16	154	113	W. R. Wilson ..	27	85
124	H. M. Chaille ..	25	153	133	R. Burns	18	84
125	H. M. Chaille ..	22	152	127	E. C. Raymond ..	13	83
140	T. Hindley	17	152	104	C. C. Dennis ..	23	78
148	J. Potter	28	149	121	W. H. West ..	13	23
139	T. Hindley	22	149	146	E. Walters	21	U149
103	C. C. Dennis ..	18	149	130	T. C. Ollier	22	U147
138	W. D. Melrose ..	16	143	108	W. H. Forsyth ..	23	U141
143	J. Pryde	25	141	150	J. Potter	12	U133
128	E. C. Raymond ..	20	135	131	T. C. Ollier	24	U135
109	G. E. Rogers ..	18	131	107	W. H. Forsyth ..	25	U131
101	J. Hutton	24	129	111	G. E. Rogers ..	29	U117
144	J. Pryde	21	119	123	W. H. West ..	22	U113
142	J. Pryde	24	114	105	C. C. Dennis ..	25	U108
126	H. M. Chaille ..	20	114	106	W. H. Forsyth ..	19	U93
100	J. Hutton	24	114	145	E. Walters ..	0	U89
147	E. Walters	7	114	114	W. R. Wilson ..	26	U80
132	T. C. Ollier ..	23	113	137	W. D. Melrose ..	3	U58
149	J. Potter	14	107	136	W. D. Melrose ..	0	U42
141	T. Tindley	21	102	129	E. C. Raymond ..	9	U29
112	W. R. Wilson ..	25	91				

OTHER VARIETIES.

118	Mrs. J. Pryde (R.I.R.) ..	21	140	153	W. H. Forsyth (S.W.)	22	92
155	W. L. Howard (W.W.) ..	20	118	159	J. Pryde (Lang.) ..	21	90
152	W. H. Forsyth (S.W.)	18	114	164	J. L. Hill (B.L.) ..	20	86
151	W. H. Forsyth (S.W.)	20	114	154	W. L. Howard (W.W.) ..	22	U118
166	A. S. Keith (Ancona) ..	12	108	156	W. L. Howard (W.W.) ..	16	U112
157	J. Pryde (Lang.) ..	18	106	160	W. and G. W. Hindes (B.L.)	26	U110
120	Mrs. J. Pryde (R.I.R.) ..	21	101	161	W. and G. W. Hindes (B.L.)	19	U106
119	Mrs. J. Pryde (R.I.R.) ..	18	98	162	W. and G. W. Hindes (B.L.)	20	U84
167	A. S. Keith (Ancona) ..	21	94	168	A S. Keith (Ancona) ..	0	U63

"U" indicates eggs under 2 oz.

C. KIDD, Hon. Secretary.

DESTRUCTION OF INSECT AND FUNGUS OR FUNGOID PESTS.

A COMPARISON OF METHODS.

By A. H. BENSON, Director of Fruit Culture.

The numerous pests of one kind or another that attack all kinds of farm, orchard, or garden crops are a very heavy tax on all primary producers, and the loss caused by their ravages is probably greater than that due to any other cause. This being so, the question of how best to combat the various pests is a matter for most serious consideration, especially as the cost of treatment is of much importance. Remedies that cost more to purchase and apply than the extra value of the returns obtained as a result of their application are of little, if any, use to the commercial primary producer, to whom it is essential that the cost of treatment be kept as low as possible.

In order to determine how this may be brought about it is necessary to compare the methods now in use for the destruction of insect and fungus or fungoid pests.

A Review of Methods.

This necessitates a brief résumé of the work that has been done during the past fifty years, for prior to then there were few mechanical aids for the distribution of the various remedies, such simple contrivances as the ordinary garden syringe and the sulphur bellows being mainly depended upon. The first great advance was made when force pumps fitted with specially constructed nozzles, capable of distributing the liquid used in the form of a very fine mist, were introduced, as it was found that the material used for the destruction of the various pests could be much more economically, effectively, and rapidly applied by them than by any previously existing method. The pumps so used were known as spray pumps, and the operation of applying the various remedies was known as spraying.

Spraying was in general use for several years in the United States of America before it was introduced into Australia, and it was not until the early nineties that the first public demonstrations of spraying fruit trees were given by the writer—then an officer of the New South Wales Department of Agriculture. Since then spraying has made wonderful strides, as in place of hand-power force pumps we have now motor pumps capable of being worked at a very high pressure, which, when fitted with improved nozzles—of which there are many kinds—are capable of producing any kind of spray that may be required, from the finest mist to the long-distance, more direct spray, obtained by the use of a spray-gun.

There has also been an equally great change, not so much as regards ingredients as the method of preparing the various spraying mixtures. At first practically every spraying mixture was made by the actual user of the spray, but now large numbers of proprietary spraying mixtures, in a more or less concentrated form, are on the market. These proprietary spray mixtures are, as a rule, ready for use, all that is required being to add a quantity of water to them in order to reduce them to the desired strength. Their use saves the producer a lot of work, time, and trouble, but I am by no means convinced that the results are in any way superior to those obtained when the spraying mixture was manufactured by the user. This is certainly the case where fungicides such as Bordeaux or Burgundy mixtures are used.

In this State there is one great drawback to spraying, especially for field crops, and that is the difficulty that is frequently met with in obtaining an adequate and suitable supply of water. This adds materially to the cost, as the labour entailed, first in obtaining the necessary water, and secondly in applying the spraying material in a liquid form, is so costly that many producers frequently prefer to run the risk of loss by disease rather than incur the expense of spraying. This does not apply so much to orchard or vineyard spraying as to the spraying of such crops as potatoes, tomatoes, strawberries, melons, pumpkins, cucumbers, &c., and the question arises: Cannot these and similar crops be treated more expeditiously, cheaply, and equally as effectively by some method other than spraying?

Dusting.

This brings up the question whether it is not possible and practical in such cases to apply the material or materials required for the destruction of pests or for preventing disease in a dry form, instead of using a liquid spray. This is by no means a new suggestion, as for many years finely ground sulphur applied in the dry state has been used as a preventive of Oidium in grape vines and for the

destruction of red spider and similar spinning mites on fruit trees of different kinds, as well as on many kinds of plants. During recent years the application of insecticides and fungicides in the form of a fine dust has received considerable attention in the United States of America and elsewhere, and there are many producers who now consider dusting preferable to spraying for many diseases. As far as this State is concerned, dusting has been practically confined hitherto to the application of sulphur to grape vines, but recently, owing to the increase of insect and fungus or fungoid diseases on banana plants and fruit and the impossibility of spraying the affected plants, except at an absolutely prohibitive cost, it has been given a trial in their case with, so far, satisfactory results.

It has been found that the application of pyrethrum powder in dust form destroys the thrips that are the cause of the fruit rusting, as well as the caterpillars which gnaw and disfigure the skin of the fruit. Dusting with a copper-lime fungicidal dust has also proved effectual in preventing the injury to the fruit known as black spot or anthracnose, and there is every reason to believe it will prove equally effectual in the case of the banana leaf spot, rotting, and "cigar end" of the fruit.

PLATE 123.—APPLYING INSECTICIDES AND FUNGICIDES IN DUST FORM BY MEANS OF POPE'S KNAPSACK DUSTING MACHINE.

The work of dusting bananas, either the bunch or the whole plant, does not entail heavy work and can be carried out rapidly, whereas spraying is slow and entails very heavy work, as it must be done by hand. Only a knapsack spray pump can be used, as the bulk of our bananas are grown on hillsides that are too steep to permit of the use of a power spraying outfit, and this method of treatment is far too costly.

Dusting has one great advantage over spraying, and that is the small amount of labour required to apply the dust, so that the producer can easily do the work without any extra help—a very important consideration to the majority of producers.

There is no water to obtain or distribute, no loss of time preparing the dust, and it is very much easier to work a dusting machine or dust-gun than a spray pump, in addition to which the work is done much more rapidly.

In my opinion, dusting will never entirely supersede spraying, but will become a valuable adjunct to it. Spraying is essential in the case of contact insecticides, which must reach the bodies of the insects that are being dealt with, especially so in the case of sucking insects; but for the treatment of mites, red spider, thrips, and similar insects, the poisoning of leaf-eating and chewing insects, and the application of fungicides, dusting gives good results. The effectiveness of dusting depends very largely on the fineness of the material used—as the finer the dust the easier it is to distribute and the more evenly it is distributed. This is a very important point, and users should see that the material with which they are supplied is in the finest state of division possible.

Dusting must not be carried out on windy days; the best time is in the early morning and late evening, though a dull, quiet day answers well. Where copper-lime dust is used, the best results are obtained when the tree or plant is moist with dew, as immediately this dust comes in contact with moisture it is converted into Bordeaux mixture, which will adhere to the plant for a considerable time and thus protect the foliage and fruit against the attack of fungus spores of many kinds.

There are several types of dusting machines or dust-guns now on the market, ranging from a simple rubber bulb, such as that used with a motor horn, and fitted with a rubber cork and short length of brass tube, to powerful power-dusting machines on wheels with various types of dusters, rotary and otherwise, and knapsack dusting machines between those two extremes.

With respect to knapsack dusting machines, which appeal to me as the best all-round dusters to use in this State, it is interesting to note that a very effective machine very similar to the French "Torphile" knapsack sulphurer, used for sulphuring vines, is now being manufactured in Brisbane, and is being offered for sale at a lower price than any imported duster of equal quality and capacity. The illustration shows the machine at work.

Poison Gas as an Insecticide.

In addition to the use of fungicides and insecticides in the form of a spray or dust, there is the well-known method of destroying insects by subjecting them to the fumes of poisonous gases, the most effectual remedy for all insects that live by suction. Here again the use of a dry powder—very finely ground calcium cyanide—is taking the place of sodium and potassium cyanide, as this powder does not need the addition of sulphuric acid to liberate its poisonous gas, but gives off hydrocyanic acid gas when it comes in contact with the air. The tree to be treated is covered with an airtight sheet in the same manner as that employed where the gas is generated from the cyanide and acid placed under the tent, the only difference being that the dust is blown into the tree under the sheet by means of a special blower.

Where insects injure the roots of the tree or plant new methods of destruction are now being thoroughly tested. Formerly this class of insects were found to be extremely difficult and costly to either destroy or even control, the only remedy of proved worth being bisulphide of carbon, which proved effectual in the case of the phylloxera of the grape vine when systematically injected into the soil.

Paradichlorobenzene promises to become a valuable addition to our list of insecticides, as when used in a similar manner to that employed in the case of phylloxera it is destructive to soil-infesting aphides, mealy bugs, and the larvæ of several kinds of insects that feed on the roots of plants. It is also apparently distasteful to the weevil beetle borer of bananas, as recent experiments tend to show that where it is applied to the soil surrounding beetle infested stools the bulbs leave the stools. This substance retains its characteristic scent for quite a long time when placed in the soil, being superior in this respect to any other materials that have been tested. From these general remarks it will be seen that the time has come when we can no longer depend entirely on any one method of treatment for the destruction of our numerous pests, but must employ the method which is best adapted to the particular crop or pest that has to be treated. Thus spraying must still be mainly depended upon for the treatment of most of the diseases attacking fruit trees, but dusting should be systematically tested in the case of farm crops, as well as in banana plantations, and soil fumigants should be used where crops are being injured by root-eating insects.

SOIL ACIDITY.

By C. R. VON STIEGLITZ, A.A.C.I., Analyst to the Bureau of Sugar Experiment Stations.*

It may be permissible, because of the connection of soil acidity with the general fertility of the soil, to preface my remarks with a few generalisations on soil fertility.

Soil fertility is often spoken of as though it were an absolute property of the soil. Far from being this, it is really a particular relationship subsisting between soil conditions on the one hand and plant growth on the other. The conditions affecting this relationship may be classed under two headings—

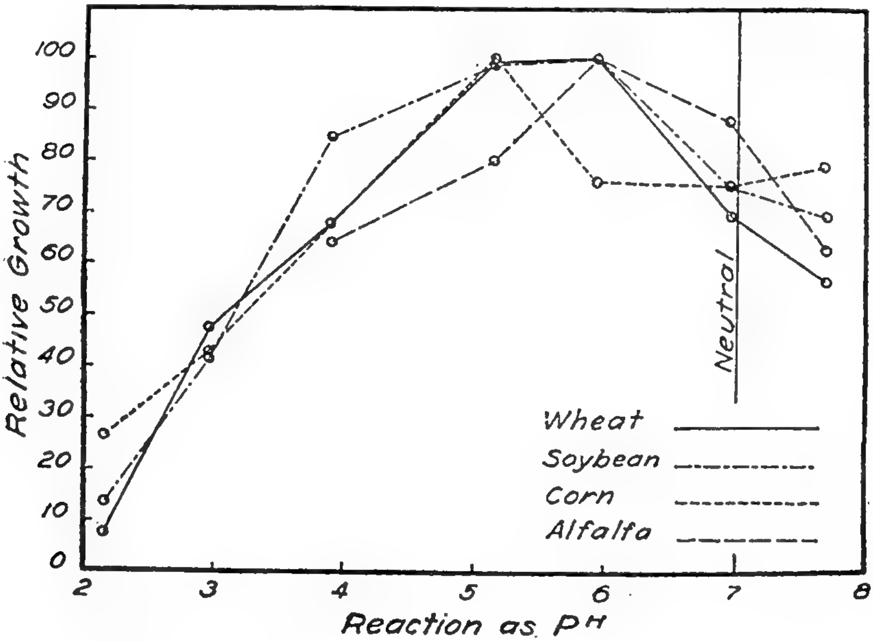
(1) Those of a chemical, physical, and biological nature.

(2) Those of a topographical and climatic nature.

So it is that an equilibrium is eventually reached in the soil which is the resultant of these various factors interacting. Some of these factors cannot vary to any great extent without limiting or controlling crop production, and fortunately most of these may be controlled by the farmer.

In particular, the reaction of the soil profoundly affects both the growth of organisms and plants, not merely through the direct effect of acidity or alkalinity, but also through the displacement effected on the complex chain of soil equilibria. Therefore the importance of "soil acidity" or "sourness," to use the farmers expression, must not be overlooked, and its attempted correction by the use of lime in various forms ranks amongst the oldest agricultural operations.

Because of the increased crop yields observed as a result of this practice, the idea became prevalent that all acidity was harmful. Modern field experiments, however, worked in conjunction with laboratory investigations, prove that most crops make optimum growth in soils showing a slight degree of acidity. It may be of interest here to append a graph taken from Dr. Russell's (1) book on "Soil Conditions and Plant Growth" showing a growth of seedlings for varying acidity (as expressed by the Hydrogen ion exponent pH) in culture solutions.



Of recent years a great amount of research has been done on the subject of soil acidity in most countries of the world, in an endeavour to account for its presence and to formulate methods for its estimation and correction.

* Paper read before Members of the Australian Chemical Institute (Queensland Branch), 23rd October, 1925.

Although much useful information has been procured, there is still much controversy as to the degree and form of such acidity which is harmful to plant growth.

Various theories have been advanced to account for its presence, and E. A. Fisher (2) of Rothampsted Experimental Station, has written an excellent résumé on this subject. There are three main theories.

1.—Humic Acid Theory.

One of the oldest theories, advanced by Sprengel in 1826, attributed the presence of acidity to the accumulation of insoluble complex organic acids—the so-called humic acids—produced by the decomposition of plant remains.

The dark alkaline solution obtained on treating an acid soil with ammonia was supposed to contain the soluble salts of these acids, and the acids themselves could be precipitated on acidifying. Soils rich in calcium or magnesium were supposed to contain these acids, combined with the bases mentioned, and were insoluble in alkalies unless previously treated with acid.

This theory was held until about 1888 when van Bemmelen suggested that these bodies were not definite chemical compounds, but mixtures of a base and various colloidal substances held together by some sort of surface attraction. These ideas were developed and extended and eventually gave rise to what is known as the

2.—Selective Adsorption Theory.

which theory is usually associated with the name of Cameron. He showed that all the phenomena of soil acidity could be explained as simple colloidal manifestations and did not require the assumption of soil acids at all.

It was only necessary to suppose that the soil colloids absorbed the base more readily than the acid of blue litmus, and all the phenomena were explained. He showed that cotton and other absorbents behaved similarly, gradually turning blue litmus red.

Work in support of this theory was done by Harris in an investigation of Michigan soils. He showed that these soils turned blue litmus red; an aqueous extract was neutral; but an extract made with a neutral salt—*e.g.*, calcium nitrate—was acid. It was, therefore, assumed that either an insoluble potent mineral acid was present or else the basic portion of the indicator was taken up in preference to the acid portion. The latter was indicated because, as in the case of peat, the amount of acid from different salts was not liberated in equivalent proportions as it should be in a chemical reaction.

3.—Basic Exchange Theory.

Many, however, still held that a real interchange of bases took place with the complex alumino-silicates of the clay fraction, with the subsequent solution of aluminium. This aluminium then hydrolysed producing an acid condition, and furthermore the aluminium was given up from the soil in amount approximately equivalent to the base taken up. According to Daikuhara the mineral soils of Japan and Korea fitted in with this explanation.

Hartwell and Pember showed that true acids added to nutrient solutions affected barley and rye similarly, whilst extracts of acid soils affected them differently. On investigation of the soil extracts they found that the difference was due to aluminium.

Much work has been done on the part played by the aluminium ion in the toxicity of acid soils, but modern thought tends to the conclusion that both adsorption and interchange of bases may occur together in the same soil, although possibly with different soil constituents.

The different varieties of acidity may be summarised as—

(*a*) Organic;

(*b*) Siliceous;

(*c*) Formed by hydrolysis of iron or aluminium salts.

They may adversely affect plants or micro-organisms by reason of their strength or their quantity. On the other hand they may have no injurious effect.

Various qualitative and quantitative methods have been devised to indicate the need or otherwise of a soil for lime.

Qualitative Methods.

The method probably most widely used is the observed effect of the soil on litmus. The customary method is to place some soil in a small dish, add sufficient water to bring to a thick paste on stirring, and then place on top of the soil strips of blue and red litmus paper. After about half to one hour the effect may be observed.

This method in a modified form is adopted by the Agricultural Chemist here in Queensland. The litmus paper is laid on the bottom of a glass vessel, and a piece of filter paper interposed between the litmus and the moistened soil.

H. R. Christensen (3), who has written a great deal on both qualitative and quantitative methods, prefers to use a neutral solution of litmus, shaking a few grams of the soil up in a test tube with the solution. Some soils, however, do not settle readily, and the colour of the soil at times makes observation difficult. Many other methods have been suggested, but whilst acting well enough for acid soils they mostly fail to distinguish between neutral and alkaline.

A method proposed by Comber (4) of the University of Leeds is interesting. He treats the soil with an alcoholic solution of potassium thiocyanate, and assumes that in an acid soil the potassium will liberate some iron to the solution, which will then give the red colour of ferric thiocyanate. A neutral or alkaline soil will remain colourless. To distinguish between the latter a trace of ferric chloride is added, the red colour remaining for neutral and disappearing for alkaline soils.

Hissink in Holland has used the method extensively, and correlated it successfully with hydrogen ion measurements. Other writers, however, adversely criticise it in this respect. Comber claims to have correlated it with the Hutchison-MacLennon method so widely used in England (*i.e.*, the absorption of calcium from calcium bicarbonate).

Another recent method is one suggested by E. M. Crowther and W. S. Martin (5), of Rothampsted Experiment Station. A calcium carbonate suspension in distilled water is alkaline to indicators such as cresol red (the distilled water being previously boiled to ensure freedom from carbon dioxide). Such a suspension added to a few grams of an acid soil and shaken, will be almost instantly changed to the yellow form. Neutral or alkaline soils will remain unchanged. The test illustrates the ability of acid soils to decompose calcium carbonate.

Quantitative Methods.

Quantitatively chemists study acids in two ways (6)—

1. By measuring the hydrogen ion concentration, a value based on the assumption that an acid on solution in water, dissociates into two parts called ions—one being hydrogen and the other the rest of the molecule.
2. By determining the titration value—*i.e.*, the number of c.c's of standard alkali solution which a given volume of the acid solution will neutralise.

This measures the total quantity of hydrogen ions producible under the conditions of the experiment, supposing them to be neutralised or linked up with hydroxyl ions as quickly as they are liberated, but makes no distinction between strong and weak acids which produce marked differences on plant life.

Most of the "lime requirement" methods provide a more or less rough measure of the titration value, the differences observed (which are often considerable) as between different methods, are partly due to absorption and partly to the number of hydrogen atoms concerned.

The determination of the hydrogen ion concentration—*i.e.*, of the ions actually present, as distinct from those that would finally be liberated on neutralisation—attempts to measure the intensity of the acid as distinct from its quantity.

The principle is based on the ordinary dissociation law

$$\frac{H^{\cdot} \times X'}{HX} = K.$$

where $H^{\cdot}$ and X' are the ions produced on the dissociation of the acid HX and K is a constant.

Hydrogen Ion Measurements.

There are two ways of measuring the number or concentration of the ions—

1. Electrometrically.
2. Colorimetrically.

The latter has found most favour in connection with soil work, and seems to correlate fairly well with the more accurate and more lengthy electrometric methods. H ion concentration is usually recorded as pH value—*i.e.*, the common logarithm of the reciprocal of the H ion concentration. A method proposed by Gillespie (7), U.S.A., described the estimation of pH values for soils without the aid of buffer mixtures.

Briefly the principle of the method is the following:—At a definite pH value a certain definite per cent. of a dissolved indicator is in the acid form and the rest in the alkaline form. To express this Gillespie gives the following equation

$$pH = K + \log \frac{\text{alkaline form}}{\text{acid form}} \qquad 1$$

where K is the dissociation constant for the indicator concerned.

If now the alkaline and acid forms are separated for convenience in test tubes, the colour effect observed on viewing the tubes together will be the same as when the two forms are present in the one solution.

This division was accomplished by dividing 10 drops of indicator into various drop ratios such as 1 to 9, 2 to 8, 3 to 7, &c., one portion was made acid, the other alkaline.

The colour effect, produced by observation of any one pair of tubes, can then be correlated with the colour produced by a solution of known pH value on the same amount of indicator undivided—*i.e.*, equation 1 may be written:

$$pH = K + \log \text{``drop ratio.''}$$

If now a soil solution is compared with the known pH value of a certain pair of tubes, its pH value is at once assessed. The effects are viewed by means of a boxlike comparator containing spaces for six test tubes (the test tube being as uniform as possible). For a detailed account which cannot be given in a short paper of this description, reference must be made to that written by Gillespie.

Many attempts have been made to correlate the pH value of the soil with its lime requirement. Much useful information has been obtained when the investigations have been confined to soil of a distinct type, and for particular crops the fluctuations of the pH value have been correlated with the increase and decrease of crop production.

Much interesting work has recently been published on H ion estimation in soils by E. M. Crowther (8), of Rothampsted Experimental Station. He determined a succession of pH values for different soils, after additions of increasing quantities of $Ca(OH)_2$ until neutrality or alkalinity of the solution was shown.

The following graphs taken from his paper are interesting:—

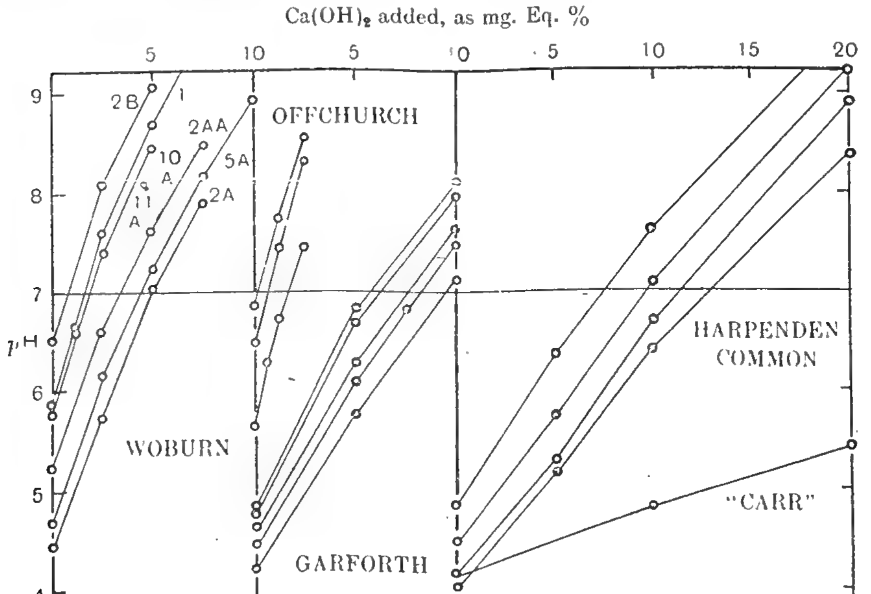


Fig. 2*b* Fig. 2*c*

It will be noticed that for different degrees of acidity in the same soil type a series of similar curves resulted.

Crowther's measurements were carried out electrometrically in a soil water ratio of 1/5. A measure of the lime requirement of the soils in question was thus obtained from these curves. In field experiments the effect produced is generally less than that indicated.

Titration Methods.

A method used extensively in England, and which for a time was adopted in Queensland by the Agricultural Chemist, is that of Hutchison and McLennon (9). In this method a known quantity of soil is treated with calcium bicarbonate solution for a definite period. The filtered extract is titrated against standard acid, and by use of a factor the so-called "lime requirement" per acre is expressed as either per cent. or cwts. of calcium carbonate, according to the particular convention employed.

A method used a great deal in America is that of Jones (10). An acid soil on treatment with calcium acetate will take up the calcium liberating acetic acid which is measured by titration with standard alkali and the "lime requirement" calculated from this result.

Jones's method, used in conjunction with that of Hopkins (11) (the treatment of soil with potassium nitrate solution), has been used most successfully at the Purdue Experiment Station. The study of acid soils there has been going on for about twenty years and over 10,000 samples of soil have been treated. Jones's method measures the "total acidity." Hopkins the "mineral acidity." They employ the following formula:—

$$k = \frac{H^2}{J - H}$$

where H expresses the acidity as determined by Hopkins's method and J that of Jones.

The difference gives the "organic acidity." They consider a K value of over 25 to indicate a lack of lime for lucerne, a K value of 100 or more to indicate the need of lime for all grain crops.

These two methods have been tried on all soils submitted for analysis to the Agricultural Chemist during the past year, and it is pleasing to note that 62 per cent. of these showed a K factor of nil. Approximately 14 per cent. had a K factor of 25 or more. Just how this value may be applied for different crops and different climatic conditions is a problem which must be correlated with field observations.

An investigation of some typical sugar soils was carried out by H. W. Kerr (12) before leaving for America. The worth of the above method was demonstrated as Bundaberg soils, known not to respond to liming (yet showing high total acidity) gave a negligible K factor, showing the acidity to be organic in nature, which form is seldom harmful.

Some of the far northern soils showed very high K values, and it was thought as a first rough estimate that a K value of 60 or over would certainly indicate the need of lime for sugar-cane.

During the past year only two soils exceeded this value, one being 74 and the other 125. In both cases the cane was doing badly. It is hoped shortly to estimate the pH values of soils showing a high degree of mineral acidity.

In conclusion, it may be stated that when applying lime to acid soils as a corrective measure due consideration should be given, not only to the form and degree of such acidity, but also to the particular crop in question, as different crops show marked differences in their love for lime.

Soils showing high mineral acidity will benefit firstly by an application of lime followed by superphosphate. The form of lime to be used will depend to a great extent on the physical texture of the soil in question.

Summary.

1. No one theory is adequate to account for the presence of acidity in soils. Different classes may exist in the same soil.

2. Both hydrogen ions and aluminium ions may prove toxic to plants.

3. No qualitative method has yet been proved to act in a reliable manner for all classes of soils, but when dealing with the variations of one type much useful information may be obtained.

4. Most quantitative methods for expressing "total acidity" differ in the result obtained owing to absorption effects. Very useful results have been obtained in America by the use of a formula connecting the "mineral acidity" and the "organic acidity."

5. Routine methods for H ion estimation are best carried out colorimetrically.

6. When attempting to correct for acidity in soils due regard must be given to the crop concerned and to the physical texture of the soil.

References.

1. Dr. Russell, "Soil Conditions and Plant Growth," p. 82.
2. E. A. Fisher, "Journal of Agricultural Science," Vol. xi., Jan., 1921.
3. H. R. Christensen, "Soil Science," Vol. iv., 1917, p. 115.
4. N. M. Comber, "Journal of Agricultural Science," Vol. xii., Oct., 1922.
5. E. M. Crowther and W. S. Martin, "Journal of Agricultural Science," Vol. xv., April, 1925.
6. Dr. Russell, "Soil Conditions and Plant Growth," p. 113.
7. L. J. Gillespie, "Soil Science," Vol. ix., Feb., 1920, p. 115.
8. E. M. Crowther, "Journal of Agricultural Science," April, 1925.
9. Hutchison and McLennan, "Journal of Agricultural Science," Vol. vii., 1915, p. 75.
10. Jones, "A.O.A.C. Journal," Vol. iv., p. 203, Feb., 1921.
11. Hopkins, "Journal of Ind. and Engin., Chem.," March, 1916, p. 245; also Feb., 1924, p. 173.
12. H. W. Kerr, "Queensland Agricultural Journal," June, 1924, p. 413.

WHEAT CROP PROSPECTS.

Mr. C. S. Clydesdale, Assistant Instructor in Agriculture, who has just completed a visit of inspection of some of the Departmental Wheat Experimental Plots on the Darling Downs, situated at Inglewood, Pratten, Allora, Southbrook, and Pittsworth, stated in the course of a recent Press interview that weather conditions were affecting the outlook. Some of the departmental varieties were only affected, however, in a minor degree, indicating in no uncertain manner that individual wheats possessed greater resistance to dry weather and to frosts than others, so much so, that the experience to be gained in a season like the present was invaluable from the point of view of an experimentalist in appraising the true value of a variety for Queensland conditions. Speaking generally of the prospects of the wheat crop there had, unfortunately, been a rather severe set-back through a continuation of the dry weather accompanied by westerly winds, also from the effect of late frosts.

In the Inglewood district, many fields are planted rather too late in the season and the wheat never thoroughly established itself. On such situations the crops were being fed off in preference to allowing them to mature, as at best they could not be expected to yield more than a few bushels of grain per acre. A limited area of early-sown crops grown on well-prepared land may yield from three to four bags per acre, but rain is urgently required.

In the Allora district the crops looked better than in any other locality visited; here, the straw ranges from 2 to 3 ft. in height, the better grown crops being found on the higher country where the yields of grain should average about four to five bags per acre; this anticipated increase in yield being influenced to some extent by heavier falls of rain in the early part of the season. On the low-lying, heavy black soil country, growth and development were not so good, nor were the crops anything like so forward. Two heavy frosts on the 18th and 24th September caused much damage, particularly to the favoured Pusa variety, which at that time was both in the shot blade and flowering stage.

The Cunningham-Pratten area also appeared to have felt the dry weather, but here again the wheat on the more elevated and well prepared lands showed much more promise than on the heavier type of country on the low lands.

In the Southbrook district, the crops, generally, were above the average; here, the wheat is a little more forward than in other districts mentioned, and as good rain fell in August in this locality, it came at a time when the young plants could make better use of the moisture, inducing them to stool and to develop a better root system, which latter has since enabled the ripening crops to stand up against the recent dry spell.

Several weeks ago the Pittsworth district wheat plots gave much promise, but latterly the dry weather had reduced expectations of the grain yield by fully 50 per cent.

A general review of the outlook for this year's wheat crop is not at all promising. A larger area was put in, estimated at about 25 per cent. more than that of last year, but unless rain falls almost immediately there is little prospect of obtaining, in the aggregate, any more than a light crop.

FERTILISER DONT'S.

By J. C. BRÜNNICH, Agricultural Chemist.

Don't apply fertilisers unless you know how.

Don't buy cheap fertilisers.

Don't buy low-grade fertilisers, as the cost of handling and carting of useless bulk is largely in excess of its value.

Don't buy fertilisers without getting full details of the plantfoods they contain, and the form in which the plantfoods are present, in accordance with the regulations under the Fertilisers Act, which is specially framed for the protection of the farmer.

Don't expect results from fertilisers containing one plantfood only, except in a few special cases.

Don't scoff at scientific farming, but listen to the advice of persons who made the use of artificial fertilisers their special study.

Don't apply fertilisers without a full knowledge of the requirements of the crop and condition of your soil.

Don't expect too much from the chemical analyses of the soil and of the crop; they are only useful hints and may point out striking deficiencies, but other factors may be of great importance.

Don't hesitate to apply to the Department of Agriculture and Stock for any information you desire to get, and obtain the pamphlets bearing on the subject of fertilising.

Don't be afraid to make fertiliser trials on a small scale, as the results obtained therefrom are a valuable guide for the use of fertilisers on a larger scale.

Don't expect results from fertilisers if the season is unfavourable for want of rain.

Don't lose hope if you do not get satisfactory results with your first experiments, but try and try again.

Don't expect that the application of artificial fertilisers will replace good and thorough cultivation.

Don't expect that any artificial fertiliser will give good results if the soil is in a bad physical condition and contains little or no humus.

Don't expect that artificial fertiliser can replace farmyard manure; but, if possible, use them conjointly.

Don't apply the same kind of artificial fertiliser year in year out, but make a change occasionally.

Don't apply the fertiliser at the wrong time; it may be all lost before the crop can utilise it.

Don't apply large amounts of artificial fertilisers at one time, as better results are obtained by applying portions in two or more dressings during the growth of the crop.

Don't let your plants come in close contact with large amounts of artificial fertilisers, but mix the fertiliser well with the soil.

Don't overlook the difference between quick and slow acting fertilisers, and use the former if you want immediate results with quick-growing crops.

Don't think that one application of fertiliser will last for many seasons, but use fertilisers regularly.

Don't expect that, after years of cultivation without the use of fertilisers, an application of complete fertilisers will give you at once a good crop.

Don't expect that green manuring alone will maintain soil fertility, as the green manure crop cannot return more plantfood than it took from the soil, but it makes the same more available.

Don't apply nitrogenous manure too liberally if you want to get a high yield of grain, fruit, or tuber.

Don't think that lime is a fertiliser and can replace all other fertilisers.

Don't mix quicklime with any fertiliser containing nitrogen in the form of ammonium salts, or in form of organic nitrogenous compounds, present in blood and meatworks fertilisers, but apply the quicklime, after being air-slaked, a few weeks before other fertilisers.

Don't leave bags of fertilisers in the open, exposed to all weathers, but keep them under shelter.

Don't forget that fertilisers not only improve quality and quantity of the crops, but give them a better stamina to resist diseases.

Don't sell all your soil fertility with your crops and stock, and thus overdraw your banking account with your soil, but maintain the soil fertility by the combined use of green manuring, application of farmyard manure and artificial fertilisers, and deep and thorough cultivation, as the natural fertility of a soil once lost is very hard to build up again.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING SEPTEMBER, 1925 AND 1924, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of Years' Records.	Sept., 1925.	Sept., 1924.
North Coast.	In.		In.	In.
Atherton	0·65	24	0·27	2·42
Cairns	1·71	43	0·72	4·08
Cardwell	1·43	52	0·82	0·57
Cooktown	0·57	49	0·54	0·89
Herberton	0·50	38	0·99	1·44
Ingham	1·27	33	1·69	1·84
Innisfail	3·56	44	3·12	2·61
Mossman	1·34	17	1·07	2·19
Townsville	0·79	54	1·33	1·21
Central Coast.				
Ayr	1·48	38	1·48	0·24
Bowen	0·81	54	0·97	0·44
Charters Towers ...	0·76	43	0·87	0·30
Mackay	1·59	51	1·61	0·89
Proserpine	2·11	22	1·95	0·48
St. Lawrence ...	1·31	54	2·12	1·36
South Coast.				
Biggenden	1·68	26	0·39	2·00
Bundaberg	1·78	42	0·57	2·03
Brisbane	2·08	74	0·42	1·16
Childers	1·95	30	0·76	2·68
Crohamhurst ...	2·71	30	0·59	2·12
Esk	2·28	38	0·27	2·35
Gayndah	1·58	54	0·89	3·20
Gympie	2·17	55	0·53	2·39
Caboolture... ...	1·95	38	0·24	1·71
Kilkivan	1·75	46	0·31	3·25
Maryborough ...	1·98	53	0·67	3·57

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of Years' Records.	Sept., 1925.	Sept., 1924.
South Coast—continued:	In.		In.	In.
Nambour	2·48	29	0·30	1·83
Nanango	1·92	43	0·87	2·18
Rockhampton ...	1·30	38	1·04	1·83
Woodford ...	2·22	38	0·37	2·12
Darling Downs.				
Dalby	1·80	55	0·53	3·50
Emu Vale ...	1·95	29	0·93	35·2
Jimbour	1·63	37	0·21	30·3
Miles	1·49	40	0·28	2·87
Stanthorpe ...	2·47	52	0·49	3·85
Toowoomba ...	2·25	53	0·30	3·51
Warwick	1·91	60	0·61	3·09
Maranoa.				
Roma	1·56	51	...	1·62
State Farms, &c.				
Bungeworgorai ...	1·36	11	0·01	1·78
Gatton College ...	1·73	26	0·26	2·65
Gindie	1·12	26	...	1·24
Hermitage ...	1·72	19	0·78	2·62
Kairi	0·61	10	...	0·72
Sugar Experiment Station, Mackay	1·49	28	1·40	0·70
Warren	0·73	11	1·07	1·40

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for September this year, and for the same period of 1924, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Meteorologist.

THE CLYDESDALE HORSE.

By H. S. HUNTER, Treasurer, Clydesdale Society of Queensland.

The horse is again coming into his own. An increasing accumulation of evidence received from many countries indicates distinctly the swing back to normality after the revolution in methods of hauling, brought about by the improvement of mechanical power. Whilst it is admitted that the motor truck and the motor tractor are superior to the horse in speed and power for certain kinds of work, it is also realised that the draught horse is still indispensable, and may be regarded as an economic necessity on the farm, on the road, and in the city. Owners of motor vehicles, who are now able to review the efficiency of their machines in comparison with their economic working over a period of years are, in many instances, reverting to the use of the horse. We may take as an example the United States of America, where approximately 90 per cent. of the world's motors are produced, where motor fuel is comparatively cheap, and where about 87 per cent. of the motor power of the world is used. That country has gone most carefully into the question of horse usage, and, as a result of the investigations of the Horse Association of America, it has been definitely proved that the horse is absolutely indispensable. *Nearly 75 per cent. of the freight handled in New York City is still drawn by horses.*

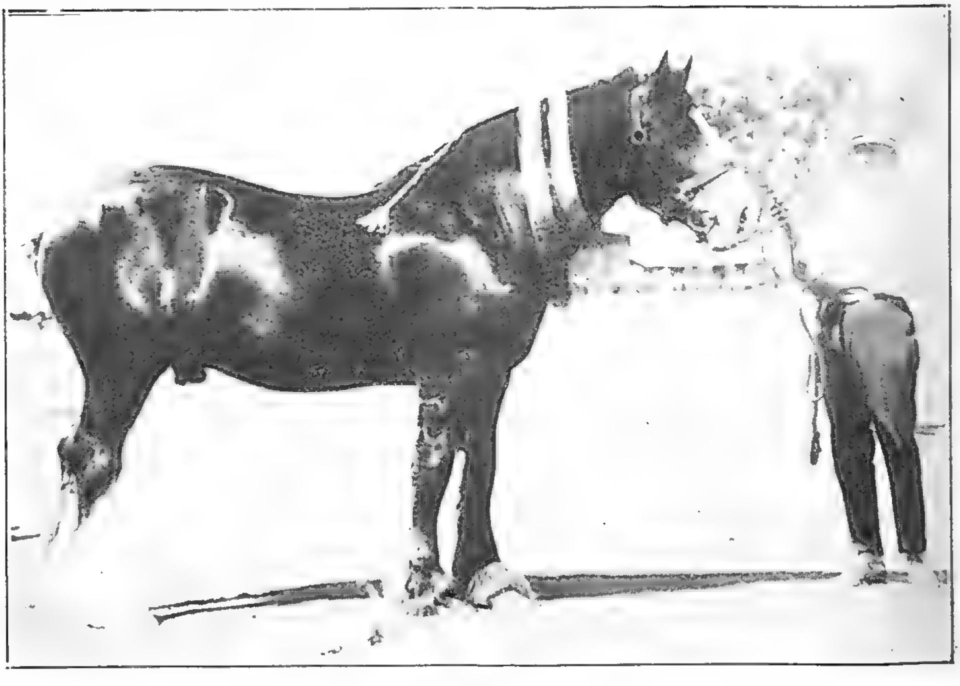


PLATE 124.—CLYDESDALE COLT, "PROFESSOR," 2 YEARS AND 9 MONTHS OLD.

First and Champion, Royal National Show, 1925. Bred by Department of Agriculture and Stock. Exhibited by Mr. Gavin Elliot, of Laidley.

In a pamphlet entitled "Facts for Horse Breeders and Horse Users," published by the Victorian Branch of the Commonwealth Clydesdale Horse Society, the following passage, having reference to horse usage in the United States of America, appears:—

"Statistics are of more valuable help to us, as they indicate the manner in which the horse has maintained its place, despite the enormous use of motor power in recent years. In 1914 there were 24,876,000 horses and mules in the States. During the war period approximately 1,400,000 horses and mules were exported to Europe. The American farmer and horse breeder experienced a most depressing time after the close of the war, and, like Australia, both horse and cattle breeding suffered. The latest horse returns are encouraging, as on the 1st January of this year the Federal Department of Agriculture estimates were 17,589,000 horses and 5,411,000 mules, in farms, and approximately 2,000,000 horses and mules in non-agricultural work. This makes a total of 25,000,000 horses and mules in the United States. When it is remembered that there are nearly 18,000,000 motor cars and trucks

in use in that country, it will be realised that the position of the horse and mule is highly satisfactory, and is a magnificent tribute to the value of these animals in all classes of work.

"It is generally claimed that the tractor will do the work of from six to eight horses, and a recent advertising report claims that half the farmers in the United States have tractors. The latter claim is a gross exaggeration, but, even if it were true, it would be a bad advertisement for the tractors, as, if they could do what was claimed for them, they should have thrown out of work the whole horse population of the United States, as there are over 6,000,000 farmers in the country. On farms investigated by the United States Department of Agriculture it was found that the average number of horses which could be dispensed with through the use of a tractor was a fraction over two head."

In the neighbouring country of Canada we have also ample evidence of the reversion to the use of the horse. During the war her farmers went in rather extensively for tractors, which, they thought, would ovecome labour difficulties. We are told on the authority of the Live Stock Commissioner for Canada that between 1916 and 1920, something like £6,000,000 was spent in the purchase of 33,000 tractors, by farmers in the Provinces of Alberta, Manitoba, and Saskatchewan. The Commissioner further stated, however, that in 1921 it was officially estimated that "not more than 10 per cent. of the tractors were being used in field work. Farmers and transportation companies learned from bitter experience that horses still furnished the cheaper form of power."

Speaking at Chicago (U.S.A.), in December last, Mr. J. G. Robertson, Live Stock Commissioner for the Province of Saskatchewan, said that—

"Horses are cheaper in all kinds of field work, and have superseded almost entirely such tractors as were used between 1914 and 1920 in field work in Canada. He cited cost figures, showing that the cost of ploughing with steam tractors was 50 per cent., and with gas tractors 100 per cent., greater than the cost of doing the same work with horses."

In Great Britain the return to the horse is no less evident. In many of the larger cities and towns there was a big increase in the use of horses last year, and in London alone the increase has been given as 25 per cent. Numerous councils, including Westminster and Ilford, have reinstated horses for all street cleaning work. In Glasgow it was found that the cost of doing this work was 40s. 11d. per day with electric motor power, as against 18s. 8¾d. with horse-drawn vehicles.

Germany has recently made large purchases of Clydesdale horses from Scotland, and it is evident that the motor is also being relegated to its proper sphere of usefulness on the Continent. A parallel state of affairs to those obtaining in the older countries, in this respect, is also to be found in Australia. Here motors are in many cases being dispensed with and their owners are reverting to the more economical use of the horse, and are thus incidentally reducing the dead national loss which is represented in all moneys paid for imported machinery, motor fuel, and oil.

In order to determine the most economical method of ploughing, comparative tests were recently carried out with the tractor and with the horse at the Werribee Experimental Farm, Werribee, Victoria, and the results of these investigations show that the cost of ploughing with the tractor was 10s. 8d. per acre as compared with 6s. 3d. per acre for work done by the horse. A difference of 4s. 5d. per acre in favour of the horse.

This revived demand, however, is not confined to horses for farm use alone. The commercial and carrying people in the large Australian cities find that the horse is the cheapest and most efficient for all short hauls. The carriers of Sydney (New South Wales) are almost unanimous in their opinion that the horse-equipped vehicle gives better service and more profitable results than the motor vehicle for heavy carrying work and for delivery operations. In a statement made to the "Daily Telegraph," Sydney, Mr. James McMahon, Managing Director of J. McMahon and Co., Ltd., an extensive carrying firm which has nearly 500 horses in regular use, stated—

"For the shorter city deliveries horses could beat the motor for cheapness. I make the comparison from the point of view that a heavy motor lorry costs £1,000 and it will draw 40 tons a day. We can put on the city streets eight two-horse wagons for the same amount of money, and they will draw 80 tons a day. The additional 40 tons, at 6s. a ton, represents £12 a day.

"The experience of all master carriers had been that horse traction in the city was cheaper and more remunerative to them. *Personally, he had tried it out and proved it to his own satisfaction.* He spoke in this way for the 240 members of the Master Carriers' Association of New South Wales, and there were probably as many

more outside of the association in the city and suburbs. Despite any competition of the motor, Mr. McMahon adds, *we are employing more men and doing more business than ever before.*"

The quality of the Clydesdale horses exhibited at this year's Melbourne, Sydney, and Brisbane Shows, and the interest displayed in this section, is only another proof of the revival of popularity of the draught horse.

It is obvious that an effort will be necessary on the part of breeders to meet this increasing demand, especially in view of the fact that the breeding of draught horses has of recent years been neglected. This fact was early appreciated by the Queensland Government, and its action in purchasing and importing six high-class Clydesdale stallions from Victoria in 1922, whose services have been made available to owners of mares at the most reasonable rate of £2 2s. per mare, has proved most advantageous to horse owners in this State, by materially assisting in the breeding of an improved type of animal at a time when high-class sires were very scarce.

During the first two seasons' operations, 791 farmers' mares, which were first subjected to veterinary examination and approval, were mated with Government Clydesdale stallions, and as a result some very promising young stock are now to be seen in the districts in which the stallions were stationed. By the end of this season well over 1,000 mares will have been served by Government Clydesdale stallions.

The advent of the State Clydesdale stallions undoubtedly gave an impetus to Clydesdale breeding in Queensland. During Exhibition week a most enthusiastic meeting of Clydesdale breeders was held in Brisbane, and a "Clydesdale Society of Queensland" was formed, with the object of promoting the breeding of purebred Clydesdales and to safeguard the breeders' interests.

In farming districts high-class sires are in demand, and farmers are realising the importance of breeding only from a good type of mare. General satisfaction is also expressed with the licensing of only approved stallions and the elimination of the nondescript entire as provided for by the recent application of the Stallion Registration Act.

It is to be understood that the existing demand is only for a good type of horse. The breeder of nondescript animals, apart from the fact that the enterprise is most unprofitable to himself, is only playing into the hands of the motor salesman.

It has long been realised that the Clydesdale is the ideal type of draught horse for Australian conditions, and if bred in the right way, and the foals and brood mares allowed a generous ration of food, the Clydesdale will supply the characteristics so much in demand—*i.e.*, weight, good appearance, hard flat bone, sloping pasterns, sound open feet, and good clean action.

Photo.: "Livestock Bulletin."]

PLATE 125.—"ODIN."

Second for eighteen months and under two years; first with "Miniver VI." in the English Hereford Herd Book's Special for pair of yearlings; second in group of three bulls; second in sires' progeny stakes. Bred by Messrs. Archer Brothers, Gracemere, Rockhampton.

MILK GOATS—I.

In response to requests for information about milk goats from readers in several parts of the State the subjoined notes have been compiled.

Goats are kept for milk production in many countries, especially Continental Europe. They are finding favour to some extent in the United States, while in pastoral and mining Australia every camp and township has its more or less nondescript flock of goats. Goat's milk forms a most important item in domestic economy, particularly in respect to the dietary scale of the bush baby in places where the keeping of cows is not practicable.

The comparatively dry western climate of Queensland agrees with goats, and they do well on country differing widely in topography and feeding conditions. Goats do not thrive well on low or swampy country.

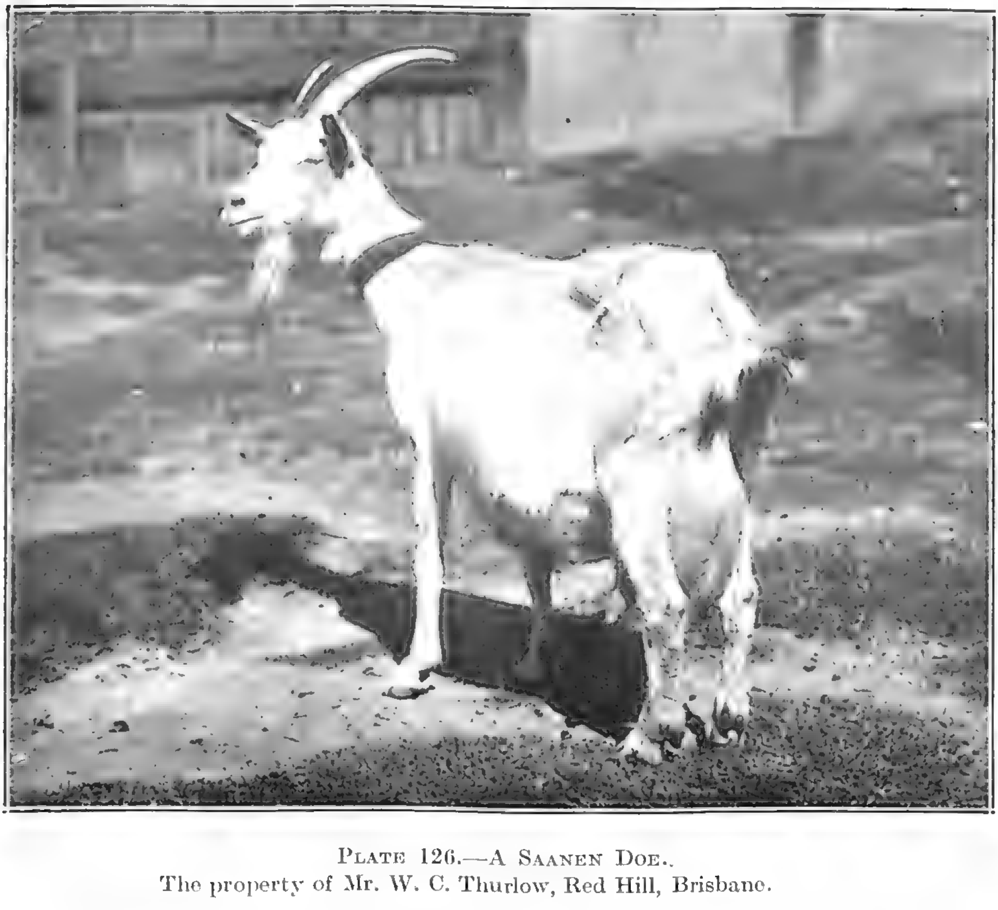


PLATE 126.—A SAANEN DOE.
The property of Mr. W. C. Thurlow, Red Hill, Brisbane.

Little has been done in this State towards improving on the common goat, and little attention is being given to methods of feeding. As a rule the ordinary milk goat that fills the role of the Western "cow" is left to fend for herself, which she does pretty thoroughly.

Goats are economical to keep, and that accounts for their popularity in the newer townships and on the mining fields. The herbage they eat and thrive on would otherwise go to waste. Not only are they valued for their milk, but also as "mutton," and many a young wether has passed over the butchers' block camouflaged as "lamb." Taken all round, provided the domestic gardens are kept securely fenced, the goat in many parts of Queensland is a valued factor in household economy.

PLATE 127.—A TYPICAL SAANEN BUCK.
The property of Mr. W. C. Thurlow, Red Hill, Brisbane.

PLATE 128.—A SAANEN DOE AND HER VIGOROUS PROGENY.
The property of Mr. W. C. Thurlow, Red Hill, Brisbane.

Breeds.

There are many breeds of milk goats, chief among which are the Toggenburg, Saanen, and Anglo-Nubian. A great variety of crosses and goats of no particular breeding also abound.

The native home of the Toggenburg is in the Toggenburg Valley, Switzerland, where it has been bred for centuries. Their prevailing colour is brown, both light and dark, with white markings. A white bridle mark is always present on each side of its face. White is also present on the underline and on the legs below the knees and hocks. White is also found sometimes on the animals' flanks. As a rule they are hornless, but horns are sometimes developed. The head is rather long, facial lines straight or slightly concave, ears of a medium size, more or less erect, although sometimes held almost horizontally. The neck is somewhat long and slender and there may be wattles at the base of the lower jaw. Toggenburgs usually have a beard, which on the male is long and heavy. The better specimens of the breed are always lean and of medium size, females weighing about 100 lb. to 140 lb., while bucks, as a rule, weigh from 110 lb. to 140 lb. Both long-haired and short-haired animals are often seen in the same herd. Generally, Toggenburgs are very hardy and excellent mothers.

The Saanen is another Swiss breed, similar to the Toggenburg in general conformation. They are a little heavier in weight, maturing bucks weighing from 175 lb. to 200 lb., and does from 110 lb. to 140 lb. They are of white or cream colour and usually short-haired. The Saanen is considered a hornless breed, but horns often occur as in the case of the Toggenburg. The Saanen could be used to great advantage in grading up the ordinary common goat herded in Queensland, as they are often white in colour. Some excellent specimens of the breed may be seen at Red Hill, Brisbane, where Mr. W. C. Thurlow, an enthusiast in goat-keeping, has a small, but notable flock.

Further and fuller notes on the goat, particularly in respect to milk values, are reserved for the next issue of the Journal.

CO-OPERATIVE COTTON MARKETING.

According to the Department of Markets and Migration, the steps that are being taken by a large number of cotton-growers in the United States of America to send cotton to Britain and elsewhere in a better condition, and to cheapen production by eliminating such middlemen as may be found unnecessary, were outlined recently to a special meeting of cotton spinners and manufacturers by a delegation from the American Gotton Growers' Exchange. The meeting was held in Lancashire.

The delegates stated that they were interested in getting cotton in the most economical way from the farmer to the factory. They were attempting to cut out as many as possible of the wastes in the production of cotton in order to get the material to spinners and manufacturers as cheaply as possible. Each of the cotton-growing States now had a co-operative marketing association of growers. These were organised legally under the laws of their several States and were federated under the title of the American Cotton Growers' Exchange. Approximately the membership consisted of 300,000 farmer growers, and there had been a good increase in the amount of cotton the Exchange had handled for its members during the three years it had operated. In the first year it had handled 600,000 bales, in the second 800,000 bales, and in the year just passed 1,000,000 bales. Moreover, there was a steady growth taking place in the membership.

The Exchange had gone very seriously into the ills of the industry, and last year they sent over to Britain a commission to investigate the condition in which American cotton arrived there. The report was a disgraceful one and disclosed that American cotton was the worst-looking, dilapidated cotton that entered the English market. It was also disclosed that the staple of American cotton was growing shorter every year and losing its prestige in the consuming markets of the world.

The delegates hoped that through their co-operative movement they would be able to interest all along the lines of distribution the men who touched the industry in overcoming that bad effect.

As an indication of the permanency of their organisation, delegates stated that in each State they were banded together for a series of years—in Texas for five years, and in some of the other States for seven years. In Texas, where they had taken out a charter for fifty years, they had been together now for four years, and they were signing up the members for the next five years fairly rapidly.

GROUND MILKING COMPETITION AT THE ROYAL SHOW.

By L. ANDERSON, Senior Herd Tester.

The Ground Milking Competition conducted at the last Royal National Show held at Bowen Park, Brisbane, in August, was a record for Queensland, and it is believed to be a record for Australia. No fewer than thirty-seven entries were received from all parts of the State, representing all breeds of cattle.

Five cows were withdrawn for various reasons, with the result that thirty-two actually competed in the several classes.

The competition, which was conducted under the supervision of Messrs. R. W. Winks and L. Anderson, Department of Agriculture and Stock, took place on 9th and 10th August.

The cows were milked three times daily—viz., 5 a.m., 12.30 p.m., and 8 p.m.

Several excellent records were made in the course of the competition. The whole of the competing animals produced an average of 51 lb. of milk daily, while in the class for the cow producing the largest quantity of milk thirteen cows averaged slightly over 60 lb. daily.

Photo.: "Livestock Bulletin."]

PLATE 129.—"IVO OF DNALWON."

First with "Floss" and "Nightshade II." in the sires' progeny stakes at this year's Royal National. Champion at Beenleigh, 1924, and has a record of 62 lb. milk in twenty-four hours and 20.3 lb. c.b. in seven days. Bred and owned by Mr. A. J. Caswell, Dralwon, Wangalpong.

"Chance of Woodleigh" put up a record for the Brisbane Show by averaging 2.895 lb. butter fat in twenty-four hours and winning for her owner, Mr. J. Phillips, the Champion Butter Fat Test, and in addition two firsts, one special, and a third for a cow giving the largest quantity of milk.

No less than fifteen animals competed in the class for cows under four years.

The winning cow "Primrose of Dnalwon," owned by Mr. A. J. Caswell, produced the excellent record of 2.60 lb. butter fat daily, equal to 3 lb. commercial butter, while Mr. Krause's "Peggy II. of Illawah" was a good second.

A new class was created this year for cows not exceeding 800 live weight. Only six of the cows competing managed to qualify for this class, in which Mr. J. Williams' Jersey cow "Carlyle Lady Lynn" had an easy win.

Class 381 for cow giving the greatest quantity of milk created great interest while the competition was in progress.

In this class Messrs. Brown Brothers' Friesian cow ''Doral Wayne II.'' was leading throughout and created a record for the ground by yielding an average of 81 lb. 10 oz. daily. It would be interesting to know if this has been equalled on any other show ground in Australia. Unfortunately this cow failed to reach the standard 3.3 per cent., and the first prize therefore went to her paddock companion ''Korndyke Lottie Canary,'' with a production of an average of 72 lb. 13 oz. daily.

Following are full details:—

Cow, four years and over, averaging the greatest daily yield of butter fat for forty-eight hours; points for lactation period conceded: J. Phillips's ''Chance of Woodleigh'' (I.M.S.), 46.32 points, 1; Brown Brothers' ''Korndyke Lottie Canary'' (Friesian), 44.8 points, 2; J. C. Mann's ''Viola of Glenmore'' (Ayrshire), 44.38 points, 3.

Cow, four years and over, averaging greatest daily yield of butter fat for forty-eight hours: J. Phillips's ''Chance of Woodleigh,'' 2.895 points, 1; Brown Brothers' ''Korndyke Lottie Canary,'' 2.675 points, 2; E. M. Franklin's ''Peggy II. of Fairfield,'' 2.671 points, 3.

Cow or heifer, under four years old, averaging the greatest daily yield of butter fat for forty-eight hours; points for lactation period conceded: A. J. Caswell's ''Primrose of Dnalwon'' (I.M.S.), 41.6 points, 1; W. M. Krause's ''Peggy II. of Illawah'' (I.M.S.), 38.88 points, 2; B. O'Connor's ''Wakeful III. of Oakvale'' (I.M.S.), 33.36 points, 3.

Photo.: "Livestock Bulletin."]

PLATE 130.—"VIOLET 2ND OF ILLAWAH.

First for I.M.S. Cow, four years and under five, in milk, and third in progeny stakes group. She has records of 54 lb. milk and 2.59 c.b. in twenty-four hours and 395.16 lb. butter fat in 273 days. Owned by Mr. M. Krause, Brooklyn Terrace, Lanefield.

Cow yielding the largest supply of milk in forty-eight hours: Brown Brothers' ''Korndyke Lottie Canary,'' 145.1 lb., 1.; E. M. Franklin's ''Peggy II. of Fairfield,'' 133.1 lb., 2; J. Phillips's ''Chance of Woodleigh,'' 132.7 lb., 3.

Cow or heifer, under four years of age, averaging greatest daily yield of butter fat for forty-eight hours: A. J. Caswell's ''Primrose of Dnalwon,'' 2.60 points, 1; W. D. Krause's ''Peggy II. of Illawah,'' 2.43 points, 2; Macfarlane Brothers' ''Bella V. of Kilbirnie,'' 1.985 points, 3.

Cow or heifer, not exceeding 800 lb. live weight, averaging the greatest daily yield of butter fat for forty-eight hours: John Williams's "Carlyle Lady Lynn" (J.), 2.365 points, 1; E. Burton and Sons' "Oxford Noble Rosette" (J.), 2.15 points, 2; R. T. Ward's "Fussy of Mountview" (I.M.S.), 1.835 points, 3.

Special prize for cow giving the best butter fat results for forty-eight hours: Jos. Phillips's "Chance of Woodleigh" (I.M.S.), 5.79.

Champion Cow.

Royal National Butter Fat Test Cow (any breeding), averaging the greatest daily yield of butter fat for forty-eight hours; points for lactation period conceded. Special and champion ribbon: Jos. Phillips's "Chance of Woodleigh" (I.M.S.), 5.79, 1 and champion; Brown Brothers' "Cornucopia Doral Wayne II" (Friesian), 4.90, 2.

Home Milking.

Ayrshires.—Cow or heifer giving the greatest yield of butter fat for twenty-four hours under Babock test: J. C. Mann's "Viola of Glenmore," 1; J. Holmes's "Tidy II. of Longlands," 2; J. Holmes's "Jeanette of Marinya," 3.

Jerseys.—J. Williams's "Carlyle Lady Lynn," 1; W. and D. Carr's "Carlyle Larkspur," 2; W. Spresser's "Carnation Butterfly," 3.

Illawarra Milking Shorthorns.—W. M. Krause's "Dolphin of Illawah," 1; A. Pickle's "Jean 5th of Blacklands," 2; Wunulla Estate's "Eileen 3rd of Wanulla," 3.

Friesians.—P. P. Falt's "Dairymaid," 1; Brown Brothers' "Cornucopia Doral Wayne II.," 2; Grindles', Limited, "Hamburg II. of St. Athan," 3.

Guernseys.—A. Cooke's "Shamrock 6th of Wollongbar," 1; A. Cooke's "Minnamurra Cherubine," 2.

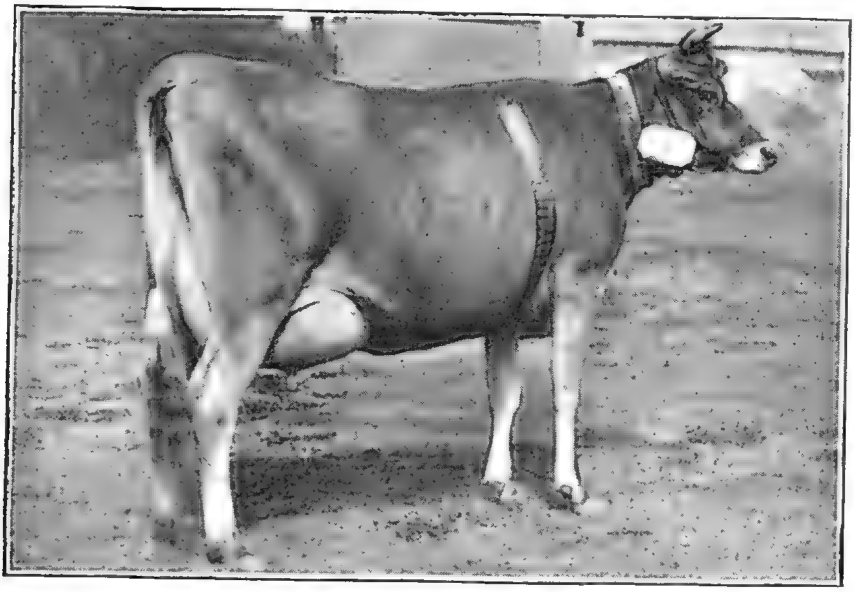


Photo.: "Livestock Bulletin."]

PLATE 131.—"CARNATION BUTTERFLY."

First prize Heifer, two years and under three; second for Australian bred cow or heifer averaging greatest quantity of butter fat in twenty-four hours with 2.242 lb.; first in group for sire and his progeny; second in breeders' group; second in group of three cows; second in exhibitors' group; first in sires' progeny stakes and reserve champion. Bred at Mr. W. Spresser's Carnation Stud, Brassall, near Ipswich.

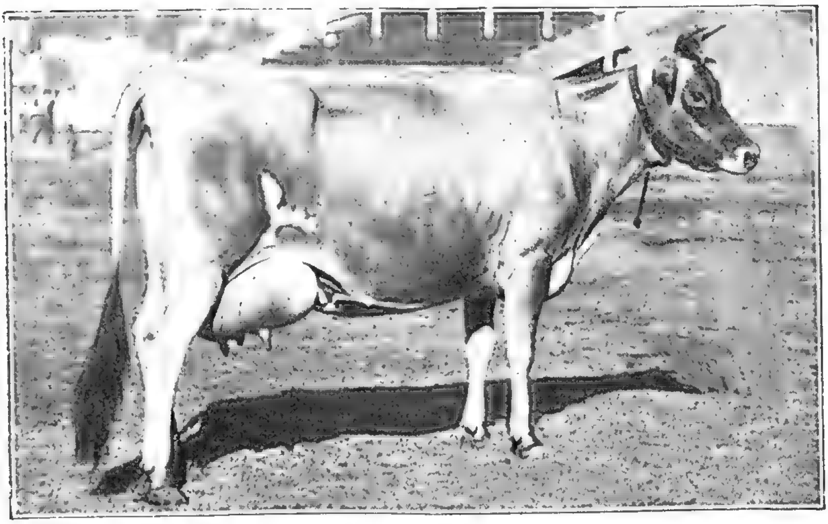


Photo.: "Livestock Bulletin."]

PLATE 132.—"OXFORD NOBLE ROSETTE."

A member of the prize-winning groups and second in the class for cow or heifer not exceeding 800 lb. live weight, averaging the greatest daily yield of butter fat for forty-eight hours. She produced 84.14 lb. milk and 4.30 lb. fat. Bred and owned by Messrs. E. Burton and Sons, Oxford, Wanora.

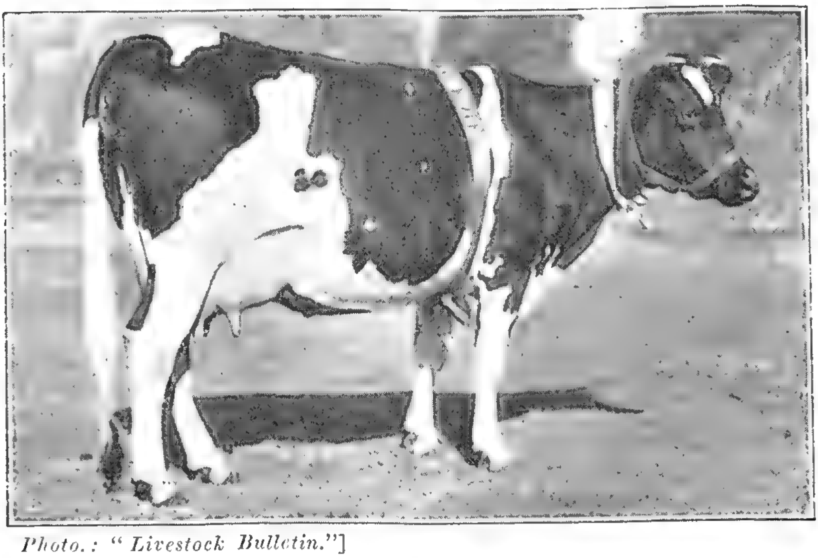


Photo.: "Livestock Bulletin."]

PLATE 133.—"MOOROOMBIN MAUD."

First Friesian Cow, two years and under three, and reserve champion. Bred by Messrs. Brown Brothers, Maroombin, Toogoolоowah.

Photo.: "Livestock Bulletin."]

PLATE 134.—"PLUM'S BOY OF MOUNTSIDE"

First I.M.S. Bull, four years and over, and reserve champion. He has also won two championships at Pittsworth and a champion and reserve at Toowoomba. The property of Mr. W. Von Pein, Pinelands, Pittsworth.

Photo.: "Livestock Bulletin."]

PLATE 135.—"MINIVER VI."

First with "Odin" in the English Hereford Herd Book's Special for pair of yearlings; second in group of three bulls. Bred by Messrs. Archer Brothers, Gracemere, Rockhampton.

Photo.: "Livestock Bulletin."]

PLATE 136.—HEAD OF THE NEW CHAMPION, "BRILLIANT OF OAKVALE."

The junior sire of the Oakvale Stud, Colinton, this year's winner of the male championship in one of the strongest showing of bulls ever seen in the Brisbane show ring. The property of Mr. Ben O'Connor.

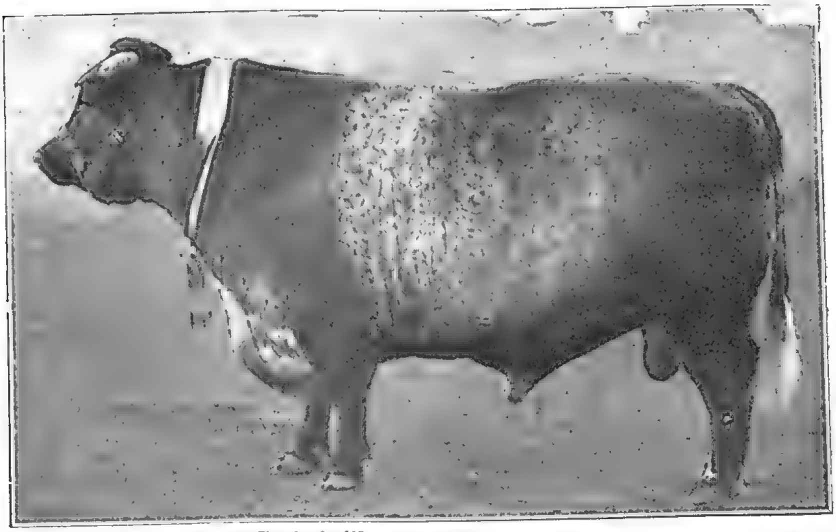


Photo.: "Livestock Bulletin."]

PLATE 137.—"STAR OF ULSTER."

Champion Shorthorn bull at Warwick, 1924; champion at Brisbane, 1924; reserve champion at Sydney, 1925, and again this year's champion of Queensland at Brisbane. The property of Mr. A. E. Slade, Glenbar Stud, Warwick.

THE WORLD'S COTTON POSITION.

The world position with regard to the supply and consumption of cotton has been causing anxiety for a good many years, states Professor John A. Todd, of Liverpool, in the "Chronicle," New York. Continuing, he says that as far back as 1902 the establishment of the British Cotton Growing Association in Manchester indicated the realisation on the part of British spinners that, while the American crop was still increasing steadily on the whole, the dependence of Lancashire on a single source of supply for the bulk of the "bread and butter" cotton, of which its consumption mainly consisted, was unsatisfactory in view of the great possibilities of the British Empire for the production of cotton. As years passed it became increasingly evident that, in view of the rapid spread of the terrible cotton pest, the boll weevil, throughout the American Cotton Belt, there was grave danger that the increase of the American crop might be checked or even reversed. The war brought about in an unexpected way a serious reduction of supplies, and when that was over the expected recovery in America did not take place, owing to the weevil reaching the Atlantic States, where its progress was much more rapid because of the favourable climatic conditions.

In 1921 the American crop was a calamitous failure, and the three following years showed only a very partial recovery. The effect was obscured for a time by the fact that a comparatively large crop in 1920 coincided with a very serious restriction of consumption, owing to the deflation slump in that year. But consumption recovered much more quickly than the crop, and in the following three years the huge surplus which had been accumulated in 1920-21 completely disappeared, and left the world in the latter half of the season 1923-24 in a state bordering on famine. During this period of depletion of supplies, however, prices again rose to very high levels, and this gradually produced an expansion of acreage which culminated in record figures in 1924. That year, fortunately, was favoured with an abnormally lucky combination of circumstances which produced the fourth largest crop in the history of cotton, but the subsequent fall of prices very quickly restored world consumption almost to a pre-war basis, for while England and the Continent of Europe generally were still well below pre-war figures, America, Japan, and some other countries had far exceeded their pre-war requirements, so that the more ample provision of 1924 soon began to appear hardly adequate. At the same time it became evident that the increased crop of 1924 was due not to a complete recovery of the producing capacity of the States, as shown by the average yield per acre, but mainly to the increased acreage.

For 1925 the prospects are in some respects again very favourable. The acreage once more established a record, and, as far as the weather is concerned, the Cotton Belt on the whole made a very favourable start, though this was qualified by a serious deficiency of the spring rainfall in Texas, which involved much danger to the final outcome of the crop unless conditions throughout the summer were abnormally favourable. There is also the danger that the weevil, which in 1924 had the most unfavourable season that it has known for many years, may again find climatic conditions to its liking and may reproduce the disastrous conditions of 1921 to 1923. The result is that the whole position with regard to the American supply is still very speculative. The world absolutely requires a big American crop this year, and it may not get it.

The world's supply of other kinds of cotton, while on the whole progressing favourably, is still relatively too small to counterbalance the risks of the American crop. For fine cotton the world is now mainly dependent on Egypt, because the small but exceedingly valuable crop of Sea Island cotton, which came mostly from Georgia and South Carolina, has been completely wiped out by the weevil, and the sole supply of that class of cotton is now a very small quantity in the West Indies. But the Egyptian crop, as will be seen from the table annexed, has also had a very bad time since 1914, and even in 1924 it did not succeed in reaching pre-war totals. The Indian crop is the only major source of supply which has definitely exceeded pre-war figures during the last three years, but its quality is, on the whole, much too low to take the place of American cotton. The same applies to the relatively large crop of China and Russia, which latter before the war had been developing very

rapidly, but suffered almost complete extinction since the revolution, and its recovery will inevitably be a slow business, as it depends more than almost any other on the general economic conditions of the country.

Other areas, such as Brazil and the various Empire fields in Africa, have increased considerably as the result of the high prices of recent years, and the efforts of the British Cotton Growing Association and others in Africa are now at last beginning to get well beyond the pioneer stage, and to produce appreciable amounts of cotton, though it is unfortunately necessary to point out that the total yield of Empire cotton in Africa in 1924-25 is estimated at no more than 320,000 bales, which is still only a drop in the bucket. No doubt the rate of increase will be maintained and probably even accelerated, but the fact remains that the whole world's supply from new cotton fields is still relatively so small that unfavourable conditions in America, resulting in a loss of 15 or 20 lb. an acre from the average yield, would more than set off any possible increase in all the new fields put together. The world, therefore, has not yet been emancipated from its dependence on the American Cotton Belt, and until the fate of the boll weevil is definitely settled in favour of the crop, the position will remain very far from satisfactory.

Thus the world is still faced with the fact that the potential consumption of cotton is likely to be limited by the supply available, mainly from America, and that the steady increase of consumption which had been going on for many years before the war is now no longer possible. Unless something happens to the boll weevil, the world will have to learn more and more to do without cotton. Some day the new cotton areas may establish a condition of balance of power, and perhaps then the development of other textile supplies, especially artificial silk, may take the place of cotton to some extent, but for the time being the old days of ample supply which made cotton the cheapest textile fabric in the world seems to be gone without hope of recall.

THE WORLD'S COTTON CROPS.

BALES OF 500 LBS. (APPROX.), 000'S OMITTED. LINTERS INCLUDED IN AMERICAN CROP.

Year.	American.	Per cent. of World Total.	India.	*Egypt.	Russia.	China.	Others.	Total.	Per cent. of 1914.
1902–03	10,784	61	3,367	1,168	342	1,200	801	17,662	63
1903–04	10,016	59	3,161	1,302	477	1,200	751	16,907	61
1904–05	13,697	66	3,791	1,263	536	756	803	20,846	75
1905–06	10,726	61	3,416	1,192	604	788	938	17,664	63
1906–07	13,305	60	4,934	1,390	759	806	1,027	22,221	80
1907–08	11,326	62	3,122	1,447	664	875	950	18,384	66
1908–09	13,432	61	3,692	1,150	698	1,933	971	21,867	79
1909–10	10,386	51	4,718	1,000	685	2,531	950	20,270	73
1910–11	11,966	53	3,889	1,515	895	3,467	968	22,700	81
1911–12	16,109	61	3,262	1,485	875	3,437	1,058	26,226	94
1912–13	14,091	58	4,421	1,507	870	2,360	1,160	24,409	88
1913–14	14,614	57	5,066	1,537	969	1,963	1,287	25,436	92
Pre-war	averages	59							77
1914–15	16,738	60	5,209	1,298	1,152	2,332	1,154	27,883	100
1915–16	12,013	56	3,738	961	1,113	2,068	984	21,177	76
1916–17	12,664	58	4,489	1,022	1,085	1,569	1,027	21,856	78
1917–18	12,345	59	4,000	1,262	605	1,583	1,086	20,881	75
1918–19	12,817	61	3,972	964	334	1,725	1,296	21,108	76
1919–20	11,921	53	5,796	1,114	302	1,690	1,483	22,306	80
1920–21	13,700	64	3,600	1,206	120	1,351	1,471	21,448	77
1921–22	8,360	50	4,485	972	78	1,340	1,436	16,671	60
1922–23	10,320	52	5,073	1,243	48	1,814	1,619	20,117	72
1923–24	10,811	52	5,162	1,306	212	1,741	1,916	21,148	76
1924–25	14,501	55	6,058	†1,440	†417	†2,000	2,073	26,489	95
Post-war	average	56							76

* 400 lb. bales. † Estimates.

THE SCIENCE OF COOKERY.

By Miss M. A. WYLIE, Inspectress and Organiser of Domestic Science Classes, W.A.*

Some women are born to be cooks; some achieve the art by long and arduous practice; some never try to cook, and others, when they do attempt it, have but little success. At some time in life, however, almost every woman has cooking to do, or she is called to superintend or pass judgment upon the cooking of others; hence knowledge of the subject is essential to all.

Cooking is a means of bringing about certain chemical changes in foods, rendering them more tender and easier of digestion; it is a means of making foods more palatable, and of producing certain appetising dishes with distinctive flavours; but, if there is ignorance of the principles of cookery, the food value is lost and the desired changes do not take place.

The first point to consider is the value of the food substances used. These may be briefly classified according to the particular part they play in the nourishment and maintenance of the body.

Meat contains albumen, which is flesh-forming material.

Fish contains gelatine, which is flesh-forming material.

Eggs contain albumen, which is flesh-forming material.

Milk contains casein, which is flesh-forming material.

Flour contains gluten, which is flesh-forming material.

Peas and beans (pod vegetables) contain legumen, which is flesh-forming material.

Flour contains starch (as well), which is heat and energy producing.

Grains contain starch, which is heat and energy producing.

Meals contain starch, which is heat and energy producing.

Sugar of milk, fruit, &c., fats of animals, nuts, and butter are heat givers.

In all fresh foods, especially in milk, fruit, and vegetables, the vitamines known as A, B, and C are found. These may be considered as the living elements, the presence of which acts as a preventive to various diseases of the skin and body, and assists in the growth of cell tissue.

The science of cookery not only aims at preserving the value of the food substances tabulated, but at breaking down and softening the fibrous network and walls of the cell that contain them. These objects are achieved by heat, either moist or dry, for heat at various temperatures effects changes in food. Water boils at 212 deg. F., when it bubbles; fat at 360 deg. to 400 deg. F., when a blue fume rises—bubbling fat indicates the presence of water, which should be eliminated; albumen hardens at 212 deg. F., and at that stage is indigestible. Thus foods containing albumen should never be allowed to reach boiling point either in oven or water. It is a well-known fact that the white of an egg—almost pure albumen—when exposed to long and great heat becomes tough and horny. This is particularly noticeable in the edges of an over-fried egg. It should always be remembered that the shell of an egg only protects the albumen from hardening, through contact with heat, for from 2½ to 3 minutes; after that time the heat penetrates and affects the texture.

The old axiom, "stews boiled are stews spoiled," is a good one, and capable of infinite application.

Custards boiled are custards spoiled.

Soups boiled are soups spoiled.

Meats boiled (after first 10 minutes) are meats spoiled, as these foods are chiefly albuminous and flesh-forming, which are hardened if exposed to 212 deg. F. Proper care in cooking can make meat tender; improper cooking can make meat tough.

* In the "Journal of Agriculture," W.A., for September, 1925.

Again, foods containing starch, such as flour, rice, and cornflour, require boiling or steaming to burst their starch cells. This is noticeable in the thickening of a white sauce. It should therefore be noted that—

Boiled puddings should be kept boiling,

Steamed puddings should be kept steaming,

until the starch cells throughout the mixture are cooked and the puddings removed from the moisture. Steam is the gaseous state of boiling water. Vapour is not steam, but moisture rising from water by means of condensation. It takes longer to steam food than to boil it, as in boiling it is in direct contact with the water.

This article will simply introduce a series dealing with the various methods of cookery, and will briefly treat with the cooking of meats.

The Cooking of Meats.

Red and white meats are composed of bundles of fibrous tubes which contain the albumens or food juices. If cut these juices are apparent and begin to ooze out and, coming in contact with the outside air, coagulate on the surface. The principles to be observed in meat cookery are—

First: That cold water opens and softens the fibres of meat and allows the juices to escape. (Experiment.—A glass of cold water containing a bit of raw meat: note the colouring of the water with the red juices.) For soups and stews, therefore, the liquid in which the meat is to be cooked must be cold to begin with, and the cooking carried on at a moderate temperature.

Second: That if the juices are to be retained, a coating in some way must be provided to protect the surface of the meat and prevent their escape. In roasting, baking, and boiling joints, for instance, the meat should be exposed—as the case may be—to a hot fire, a quick oven, or boiling water, for the first ten minutes. After that the cooking should be carried on at a moderate temperature, when there will be gradual softening of the fibres. During the first ten minutes of great heat the surface albumen becomes hardened to about the thickness of a sixpence, thus forming a casing to keep in the juices.

In shallow frying, small pieces of meat should have their surface sealed at once by exposure to boiling fat for a minute on each side and then cooked evenly for 4 or 5 minutes on each side according to the thickness of the piece.

Roasting is really cooking by the direct rays of the fire, as in the olden days, when the joint was hung in front of a fire and allowed to slowly rotate so as to produce even results. Grilling closely resembles this method of cooking, and after exposing the surface of the meat for a minute on each side for the sealing process it should be cooked evenly and turned frequently.

Third: After the weight of a joint has been decided, the time to be allowed for cooking should be considered. For large joints, pork and veal, 20 to 25 minutes to the pound should be allowed, with 20 minutes extra. For a thin piece, poultry and game, 15 minutes to the pound and 15 minutes extra.

With these principles in view the various methods for cooking meats may be easily followed.

To Bake a Joint.

1. Wipe, weigh, and trim the meat.

2. Allow time for cooking.

3. Place on a trivet or meat stand in a baking tin with fat above and below. (If the fat on the meat is plentiful it may not need more.)

4. Place in a hot oven for the first 10 minutes, then either remove to a cooler part of the oven or reduce the temperature.

5. Baste about every 20 minutes—that is, lift up with a large spoon some of the hot fat and pour it over the meat. This prevents the meat from drying and assists cooking.

TRANSFERENCE OF BEES FROM BOX TO FRAME HIVES.

The transference of bees from a box hive to a hive is best carried out in the spring during the first honey flow. Brood rearing is not then in full swing, and combs are not overladen with honey. The danger of robbing is also minimised by the presence of nectar in the fields. The work should be carried out on a sunny day, when most of the field bees are out. The beekeeper must provide as many standard hive bodies, bottom boards, and hive covers as he has boxes to transfer, and the necessary number of frames. The following requisites for the work should be provided beforehand:—Smoker, bee-brush and veil, hammer and chisel, a ball of twine, a spare box, a long-bladed knife, and a hive cover to operate upon when fitting combs into frames.

Commence by giving the colony a few blasts of smoke at the entrance; then remove the box two or three paces to the rear of its stand. Substitute for the box another hive containing a frame of brood, if available. This will make the returning bees more contented until the operation is completed. The old hive may now be turned open side upwards, or a board may be removed from the top. Place upon this the spare empty box, open side downwards, and secure by putting a weight on top. Drum the bottom hive with two sticks, and continue until the majority of the bees with the queen have clustered in the upper box. They are then shaken on a run-way in front of the new hive on their old stand.

Tying in the Comb.—The position of the combs in the old hive is next examined, and the side removed that will give access to the best ones first. Only the straightest pieces containing brood and honey in worker cells should be selected for tying into frames. To fit the combs into frames, first lay the pieces on the operating board over four pieces of string. Place the frame on top, and cut the comb to fit the frame neatly. Remove the fragments from the edges, press the frame down into position, and tie. Combs are less likely to get out of plumb if the honey, which is heavier, is put at the bottom of the frame. The smaller pieces of brood comb should be fitted together and tied into frames in the same way. As each comb is completed it is given to the bees in the new hive, placing them compactly together. Frames containing full sheets of comb-foundation may be added outside the tied-in combs according to the strength of the colony. As an extra precaution against robbing, all scraps of comb containing honey must be carefully enclosed in a tin during operations. The scraps are afterwards pressed for their honey and melted up for beeswax.

In about a week the hive may be examined, and if the combs have been made secure the strings may be removed, as they are a source of annoyance to the bees. Such combs are not up to standard, although valuable when filled with brood and food. They should be culled out at the first opportunity and replaced with good, well-wired combs or full sheets of comb-foundation, as the type of comb used in the brood chamber is a very important factor in successful beekeeping. This method of transferring may commend itself to one who has had a little experience with bees who wishes to hasten the work of establishing the bees in new hives.

Another Method of Transferring.—This is a simpler method for the inexperienced than the one described. It consists of merely turning the box with bees upside-down on its stand and allowing the bees to gradually transfer themselves.

The box is prepared as before by inverting, after which a hive is placed on top. This hive should contain a comb of brood and on each side a sheet of comb-foundation. The bees are drummed up as before, and a queen excluder inserted between the two bodies. The entrance to the hive must be above the queen excluder, all other cracks being sealed up. If, on examining the upper chamber, eggs are found on the fourth day from date of transferring, the queen may be regarded as present and the operation so far successful. The queen being unable to return through the excluded to the box, it only requires to be left there for twenty-one days, when all the brood will have emerged. It can then be removed and the combs melted up for wax. At the same time the top chamber may be set down in position on a bottom board. During the period of transfer much of the honey from the bottom box will be removed to the upper hive, thus creating a stimulus and hastening the development of the colony. Empty combs or frames with full sheets of foundation should be added to the hive as required.

This method of transferring should be adopted especially where bees are being transferred from a frame hive in which the combs have been built irregularly.—"A. and P. Notes," New South Wales Department of Agriculture.

THE BASIS OF GOOD FARMING.

A WHEATGROWER'S EXPERIENCE OF FALLOWING.*

"The basis of all good farming is fallow. The basis of maximum crops every year on that fallow is good cultivation and superphosphate. This, in turn, will give a foundation of a prosperous farm, and lead one from the period of money-saving to that of high production and money-making."

It was in these terms that Mr. W. W. Watson, Tichbourne, concluded a paper entitled "A Wheatgrower's Experience of Thirty-five Years" at the Agricultural Bureau conference at Ungarie (N.S.W.).* Presenting, as it did, the experience of a farmer who had made good under conditions of light rainfall, the paper possessed many valuable features.

His early experience, said the author, had been gained under rather hard conditions on plain lands in northern Victoria, on which as early as 1890 it was very unprofitable to grow wheat without fallowing. He had come to New South Wales in 1902, being unfortunate to hit such a dry spell for a start. He was faced, too, with strange surroundings, soils, climate, markets, and, above all, pessimists, who assured him that it was impossible to grow wheat on his class of land, as on the approach of warm weather it would burn off, and a pinched grain would be all that he would obtain. He had not known if fallowing would be successful, as there had been no previous experience.

He had ploughed the first land for fallow in the winter of 1902 with a big proportion of doubt, and even the result of the harvest following was not at all convincing. In 1906 the fallow was much better compared with the stubble, and the harvest return assured him that there might be something in fallow. The following year, 1907, was very dry, with the result that at harvest time the fallow more than doubled the stubble crop, and since then he had consistently fallowed every year. The fallow showed an average of just 20 bushels per acre over the twenty-one years, while the stubble-sown crops only returned 12 bushels, showing a 66⅔ per cent. increase, due to fallow. The average yield on fallow and stubble combined was 15½ bushels per acre, against a general State average of about 11 bushels. The yields from fallow for the past five years had reached an average of over 26 bushels per acre. He had necessarily every confidence in recommending the practice.

The Value of "Super."

One of his difficulties in the early days in Victoria had been to obtain a suitable manure. His first experience had been with a locally manufactured bonedust, which preparation, besides being indescribably offensive, was not satisfactory, as the percentage of water-soluble phosphoric acid was low, and, while its manurial value was good, it was not in a readily available form as a wheat plant-food. He was extremely glad when the manure was turned down in 1896 for the better quality material known now as superphosphate, the results from which showed that, in combination with fallow, it was a very payable proposition.

It had been his intention when coming to New South Wales to try manure and see if it was as successful as in Victoria, but for sixteen years, with a small trial of 1 to 2 tons each year, he could not get more than 2 bushels per acre increase, and with the low prices for wheat then ruling this was not profitable; in at least two years there was a distinct loss. It was not till 1920 that an improvement was shown of 3 bushels, and with wheat at 7s. 6d. this was good business. Increasing the area sown with manure the following year, there was the same increase shown over unmanured fallow, and from that date the gap had been gradually widening, till last year there had been a distinct margin of four bags to the acre.

The marked difference in the yields of wheat from manured and unmanured land during the past few years was principally due, he thought, to the process of natural consolidation taking place in their class of land. The action of weather conditions, together with the trampling of stock and the working of farm implements, had had a tendency to compact the under strata of soil below the depth of cultivation, and the experience of the past few years had shown that with more judicious cultivation and a longer fallow season more nitrates were added to the soil by the action of weather and air. It must always be distinctly understood that the liberal use of fertilisers could not make up for any deficiency in cultural methods, but with the adoption of a thorough tillage system the full benefits of good applications of superphosphate were obtainable.

---

*"Agricultural and Pastoral Notes," N.S.W. Dept. Agr.

He was fully convinced that the problem of manure or no manure was being replaced by another problem—manure or more manure—at least in that district, and the endeavour was now being made to find the minimum quantity that could be applied to produce the maximum crop.

Importance of Pure Seed.

The past fifteen years' experience had proved to him the value of pure seed, said Mr. Watson. A comparison in 1910 of the yield from pure seed as against that from his own had shown an advantage of 2 bushels per acre in favour of the former. Several years later he had again made a comparison between hand-selected seed and ordinary, when the result was a gain of 1½ bushel; also again two years ago the return was as high as 4 bushels per acre.

There had been much talk of late years of the old Federation losing vigour and distinctiveness, and only, he thought, because the seed had been neglected. The extra cost of pure seed from the Department's farms (always obtainable) was easily warranted by the sight of a vigorous growth and correct type at harvest. He had reached the conclusion that pure seed always more than paid.

There were at the present time far too many varieties grown, and confusion was the result. If farmers generally were to limit their choice to two, or at the most three, finding for themselves the varieties most suited to their climate and soils, it would be a much easier task to keep wheats pure.

Oats on the Wheat Farm.

On the subject of better methods in wheatgrowing, Mr. A. H. E. McDonald, Chief Inspector of Agriculture, pointed out that fallowing did not only mean ploughing early—it involved that the soil must be worked subsequently on right lines. The sowing of the best varieties was also essential, and so was the combination of sheep with the wheat. In order that the necessary fodder for the sheep should be made available, the Department had devoted attention in late years to oats, and varieties of that cereal had been produced that were particularly suitable for that purpose, while also affording some change from wheat. As to the value of the oats for feeding to sheep, he remarked that not only were they good green feed, but the grain had been proved quite lately to be profitable when fed to sheep. In trials at Bathurst and Cowra Experiment Farms, it had been shown that instead of oats being worth only a couple of shillings a bushel on the market, they made gains, when fed to ewes with lambs at foot, which gave them a value of 6s. per bushel. When the greater yields from oats were taken into account, they were thus worth quite as much as wheat if used in conjunction with sheep.

Photo.: "Livestock Bulletin."]

PLATE 138.—"LORD ETTREY OF BANYULE."

First and championship Jersey Bull of Queensland for the second year in succession and third in two groups; also winner of championships at important country shows. The property of Mr. J. Sinnamon, Trinity Stud, Goodna.

General Notes.

The Governor and the Farmers.

Writing from Kureen on the Atherton Tableland to the editor of this Journal, His Excellency, Sir Matthew Nathan, expresses cordial appreciation of the good wishes of all connected with agriculture in this State, which were extended to him on the eve of his departure from Queensland.

State Wheat Board.

Nominations have been received in connection with the forthcoming election of representatives of growers to the State Wheat Board as under:—

District No. 1—William Thomas Mulholland, Jandowae; Robert Swan, Wallumbilla.

District No. 2—David R. Edwards, Nobby; Alfred John Harvey, Pittsworth; Arthur Karl Kreig, Brookstead.

District No. 3—Harry C. Bradford, Oman-ama; B. C. C. Kirkegaard, Freestone.

District No. 4—Thomas Muir, Allora.

District No. 5—John Archibald, Oakey; John Thomas Chamberlain, Kingsthorpe.

The election of members will take place on the 12th November, 1925, and those members elected will hold office until the 31st August, 1926.

Reorganisation of the Council of Agriculture.

Fresh regulations have been approved in connection with the reorganisation on a commodity basis of the Council of Agriculture. The amendment of the Primary Producers' Organisation Acts and the Regulations under the Act, as amended, provide for the election of eight district councils for the agricultural districts and an agricultural advisory board for the Atherton Tableland. Local producers' associations in each district are grouped in nine wards. Each ward will return one member to its district council. Each district council will be composed of nine members. Suppliers to each sugar-mill will elect a suppliers' committee of three for that mill and, at the same time, will elect one representative for the district executive for each of the nine districts. The district executive will elect one representative for a sugar council, and the sugar council will elect a representative for the Council of Agriculture. The Council of Agriculture will be composed of representatives of the District Council of the sugar industry, fruit industry, and the several commodity boards, making a total of twenty-one members. The district councils and representatives of the sugar organisation will be elected in the month of December. Nomination forms are now being sent out, and are returnable on or before the 23rd November. The results of the election will be declared early in January, and the new members will meet either at the end of January or the beginning of February.

Dunedin Exhibition.

The Minister for Agriculture and Stock (Hon. W. Forgan Smith) advises that Queensland will be well represented at the forthcoming New Zealand and South Seas Exhibition which is to be opened at Dunedin on 17th November. It should be a splendid advertisement for the State, as exhibitions of this kind attract people from all parts of the world, and experience goes to prove that no country with such wonderful latent resources as Queensland possesses can afford to let an opportunity of this kind pass to make its products more widely known. The Exhibition, it is understood, will be open for five months. This will permit of readily renewing supplies of dairy products, hams, bacon, fruit, and other Queensland exhibits.

The Queensland Court (3,000 superficial feet) is to occupy a good position in the Exhibition Building, and its three main features will be Agriculture, Forestry, and Mining. Sixty cases of exhibits have already been forwarded by the Department, representing the State's major and minor agricultural industries—Sugar and sugarcane, wool (greasy and scoured), maize, wheat, cotton, canary seed, peanuts, broom millet, a collection of native grasses, pipe and cigar leaf tobacco, rice, cassava, sisal hemp, ropes and twine, a comprehensive assortment of farm and garden seeds, and a collection of cereals and fodders done up in attractive form.

The whole exhibit has involved a good deal of painstaking, preparatory work, but it is felt certain that the Queensland display will do credit to the State. An officer experienced in exhibition work, Mr. H. W. Mobsby, who represented the State at the Panama Exhibition, the Exhibition at Lyons, France, and at Wembley last year is in charge of the Queensland Exhibit.

Staff Changes and Appointments.

Mr. C. J. F. Miller, Land Commissioner, Cairns, has been appointed Government representative on the Cook Dingo Board, *vice* Mr. A. H. Scott, resigned.

Mr. R. H. Curry, of the Aboriginal Settlement, Palm Island, and Mr. L. G. Jones, of Brisbane, have been appointed Officers under and for the purposes of the Animals and Birds Acts.

A More Durable Butter.

A British journal reports that a more durable butter is being produced in Holland by churning in an atmosphere of carbon-dioxide. The air is easily withdrawn from the churn and replaced by the heavier gas. The portion of it worked into the butter remains a long time with ordinary handling, thus keeping out the oxygen, to which natural deterioration is chiefly due. The increased expense of churning is stated to be very small.

Honey Board.

Notice has been given of the intention to create a Honey Board to deal with honey produced in Queensland by those who have, within a period of six months prior to any election or referendum in connection with the proposed Board, at least four hives of bees and who market the honey therefrom. The Board will be in operation for two years as from the date of constitution, and will consist of five members, four of whom shall be the elected representatives of the growers and one appointed by the Minister. Any petition for a poll to decide whether the Board shall be constituted must be signed by at least fifty persons qualified to vote, and must reach the Minister before the 28th November, 1925. Those who for the past six months have kept at least four hives of bees from which they have marketed honey are invited to send their names and addresses at once to the Under Secretary, Department of Agriculture and Stock, so that they may be included in the list of persons eligible to vote on any referendum. Nominations are being called for growers' representatives on the proposed Board, and will be received up to the 28th November, 1925. Each nomination must be signed by at least five bee keepers.

Proposed Grain Board.

A notice has been approved by the Lieutenant-Governor (Hon. W. Lennon) of the intention to create a Grain (Maize) Board to deal with grain produced from seed sown after the 1st July, 1926, in any part of Queensland other than the Petty Sessions Districts of Atherton, Herberton, and Chillagoe, the function of such Board to continue for a period of six years after the appointment of the members to the Board. The Board will consist of six elected representatives of the growers. For the purpose of election, the State has been divided into three districts—

No. 1 District—The pastoral district of Moreton.

No. 2 District—The pastoral districts of Darling Downs and Maranoa.

No. 3 District—Rest of Queensland with exception of Atherton, Herberton, and Chillagoe.

Two representatives will be required from each district, and nominations for election for two years from the dates of their appointments as growers' representatives on the Board will be received until the 14th November, 1925. Each nomination must be signed by at least ten growers of maize.

Persons deemed to be growers and eligible to vote on any referendum or election before the 30th June, 1926, in connection with the Board will be persons who have grown at any time subsequent to the 1st July, 1924, for sale, grain (maize) in any part of Queensland other than the Petty Sessions Districts of Atherton, Herberton, and Chillagoe. Persons eligible to vote at any subsequent referendum or election will be persons who at any time during twelve months preceding such election or referendum grew for sale grain (maize) in the aforesaid part of Queensland.

The Board, if formed, will have power to encourage, provide, or assist in the providing of grain silos and other storage or handling facilities, and may engage in any other activities as may be approved by the Governor in Council.

Any petition for a poll to decide whether the Board shall be constituted must be signed by at least fifty growers of maize as above, and must reach the Minister before the 14th November, 1925. Persons who grew maize for sale in Queensland (excepting the Petty Sessions Districts of Atherton, Herberton, and Chillagoe) from seed sown after the 1st July, 1924, are invited to send their names and addresses at once to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Proposed Canary Seed Board.

A notice has been approved by the Lieutenant-Governor (Hon. W. Lennon) of intention to constitute a Canary Seed Board to deal with canary seed harvested in Queensland during the seasons 1925-1926, 1926-1927. The Board to deal with such canary seed will consist of three persons—two elected by growers and one appointed by the Minister. Persons deemed to be growers and eligible to vote on any referendum or election in connection with the said Board will be persons who have grown canary seed between the 1st March, 1925, and the 28th February, 1927.

Any petition for a poll to decide whether the Canary Seed Board shall be constituted must be signed by at least fifty growers as defined above, and must reach the Under Secretary, Department of Agriculture and Stock, before the 14th November, 1925. Persons who have grown canary seed since the 1st March, 1925, are invited to send their names and addresses at once to the said Under Secretary.

Nominations will be received until the 14th November, 1925, for election (for one year from election) as growers' representatives on the Board. Two representatives only are required, and each nomination must be signed by at least five growers of canary seed.

The Co-operative Movement Gaining Ground.

Co-operation, as a world-wide movement, growing in strength and permanent in nature, was the view presented at a recent session of the American Institute of Co-operation by Professor Fay, of Toronto University, Canada, formerly of Cambridge University, England.

Professor Fay challenged critics who aver that the co-operative movement is of short duration, and presented a bird's eye view of the development of this idea in many lands. He said it would be a permanent institution in the United States because it is the outcome of "economic evolution and combines sound business practices and inspiring ethical standards."

Professor Fay traced the development of co-operation among farmers in various parts of the world, and added:—

"For the last twenty-five years the new world has come in line with the old, and with such brilliant examples as the California fruitgrowers and the Canadian wheat producers to its credit is leading the way along the new co-operative paths. For rich as the new world is, and indeed just because it is so rich industrially, there is need for a counter-pressure from the side of agriculture. One day conceivably we may have giant corporation farms, but this is very doubtful, and if they do come the nation will lose the rock of social stability which a prosperous community of comparatively small farmers provides.

"But there is no stability in rural life if agriculture does not pay. Acting in isolation the farmer is his own enemy. Science shows him how to increase production, but co-operative action by himself with his fellows is needed in order to bring distribution into line with production. The organised wage-earner cannot secure the full reward of his effort and neither can the unorganised farmer."

Increased Consumption of Dairy Products—Need for Better Cows.

The number of dairy cows in the United States is increasing, as well as the number of people, but not at the same rate. In only two years out of the last six has the dairy-cow population increased in proportion to the increase in human population.

The United States Department of Agriculture has just completed a study of the utilisation of milk, in which it is shown that slightly more than 1,000 lb. of milk per capita is used annually in one form or another. In other words, a grand total of 114,666,201,000 lb. of whole milk is utilised in the United States by manufacturing it into various products, by feeding it to calves, or for household purposes. This amount was produced by 26,252,000 cows, an average production of 4,368 lb. of milk per cow.

During the last few years the increase in population has been around 1,500,000 people annually. This would mean that with cows no better than those they have at present the milk-cow population should increase at the rate of 375,000 a year to supply the necessary 1,000 lb. for each person—or one cow for every four people. It is also interesting to note that the per capita consumption of milk in 1924 was 14 lb. more than in the preceding year.

Since the average production is much too low, the United States Department of Agriculture says it is not wise to consider meeting the demand for increased supply by having more cows of the kind they now have, but it would be much better to meet the situation by breeding better cows. Not more cows but higher-producing cows are what is needed to keep pace with the increase in population.

French Demand for Canned Fruit.

According to an American official report, orders for American canned fruits to be placed during August and September will be greater for 1925 than for any other year since the war. The most popular varieties are pineapples, pears, peaches, and apricots in standard American tins. Many Diggers will recall the popularity of Australian canned fruits during the war, and some of this trade should surely come our way.

Eggs—Grading and Packing on the Farm.

At the present time fully one-third of the eggs produced on commercial farms are being either exported or cold-stored. If this were not so, instead of 1s. 4d. per dozen, eggs would in all probability be down to 1s., or even less. What this would mean to the farmer with the present high cost of feeding can be left to him to figure out.

Most poultry farmers (writes the Poultry Expert of the Department of Agriculture) appreciate the position in this respect and take every precaution to see that the eggs that leave their farms are what they should be in respect of being fresh, clean, and properly graded and packed. Unfortunately, however, there are others who are not so scrupulous about any of these things. Such consignors, by their carelessness in these matters, largely increase the cost of repacking and grading, for eternal vigilance is necessary on the part of the packers to eliminate stale and small eggs. A still worse feature is the inclusion of unfertile eggs that have been under incubation.

In pre-export days, and when cold storage was practised principally on account of pastrycooks and similar users of eggs, these practices, while reprehensible, were less serious than is the case under present conditions. The greater part of the repacking, both for cold storage and for export, is done under "pool" auspices, and the farmer pays dearly, although he may not know it, for all the extra care and vigilance that has to be exercised to eliminate such eggs, and must eventually stand any loss accruing from these causes.

Quality the First Consideration.—It cannot be too strongly emphasised that poultry farming has entered upon a phase similar to that of the dairy industry, when quality must be the first consideration. In this connection, to insure economical repacking, grading, &c., it is most essential that eggs be properly handled on the farm, gathered twice a day, marketed twice per week, and graded into three sizes. First-grade eggs should weigh from $1\frac{7}{8}$ oz. upwards, the whole to average not less than 2 oz.; second-grade should weigh $1\frac{1}{2}$ to $1\frac{7}{8}$ oz.; and all below these weights should be classed as pullets' eggs. In addition to this classification, any doubtful eggs should be labelled "case eggs"; while eggs that have been dirty, necessitating their being washed, should be labelled "washed eggs." These latter, if sent right into consumption, are quite good, but washed eggs lose their keeping qualities owing to the removal of their natural protective coating; hence they will not keep so long as unwashed eggs, and are unfit for storing or for export.

The observance of these simple rules would lighten the supervision over the packers, and enable the latter to handle very many more eggs. All such saving of labour is equal to a rise in price to that extent; and quality could be guaranteed, leading to greater confidence on the part of consumers, and inducing an increased demand for eggs. If only from motives of self-interest, greater care should be exercised in these matters.

Weighing Eggs.—In connection with grading to weights it may seem to many somewhat arbitrary that the weights quoted should be observed, but in reality the grading is very simple. Any person who has packed eggs, even for a few days, should be able very closely to gauge the size of eggs, sufficiently at any rate to reject those below grade in each case. Some people will, of course, pick up the idea of size much more readily than others; but, in any case, the quickest way to learn to do this is to have a pair of small scales at one's hand set to $1\frac{7}{8}$ oz., so that doubtful ones can be tested, not alone with a view to keeping undersized eggs out of that particular box, but in order to teach the packer to judge size. Such scales are now on sale at about 7s. 6d. per set. From another point of view good grading is profitable, and scales will pay for themselves many times over. One often sees in badly-graded consignments even 2 oz. eggs put into the second grade, whereas they should, of course, be in the first. When it is considered that the difference between first and second grade is often 4d per dozen, it will be obvious that quite a considerable loss can occur to the farmer from inefficient grading. The writer is often witness to losses sustained in this way, even by farmers who pride themselves upon their good grading. The fact is that scales are necessary to check one's judgment on size from time to time.—Poultry Expert, New South Wales Department of Agriculture.

Helping the Sale of Canned Fruit.

According to the Department of Markets and Migration, the method of preparing summer ices by freezing canned fruits right in the can is claimed by the California Packing Corporation to have been remarkably successful in the past several years. It is being featured again in a special advertising campaign carried out by the well-known "Del Monte" brand.

The value of this idea lies in the new interest it creates for canned fruits in summer.

The operation of this method is claimed to be simple. A can of fruit is packed in a bucket with equal parts of ice and coarse or ice cream salt in layers. After three hours the can is taken out, dipped for an instant in hot water, an airhole punched in the bottom, the top opened and the dish is ready.

Utilising Lower Grades of Canning Fruits.

According to an American Canning Trade Journal, extensive experiments on the utilisation of lower-grade fruits have recently been conducted in America, and several promising new products have been developed. One of these is an ice-cream fruit made by coarsely grinding pie or second-grade pears or peaches or apricots, adding one part of sugar to three or four of fruit, mixing and heating in a kettle, canning and sealing hot and processing thirty to thirty-five minutes at 212 degrees Fahrenheit. A simpler and nearly as good procedure consists in filling cans about two-thirds full of the ground fruit, filling with 55 or 60 degrees Balling syrup, exhausting at least six minutes (preferably twelve), sealing and processing thirty to thirty-five minutes. The products for lack of a better name have been called "Shredded Peach" or "Shredded Apricot" and "Shredded Bartlett Pear." They are excellent for flavouring ice-cream, but are satisfactory for use in the home in pies, puddings, gelatin desserts, cake fillings (when mixed with boiled frosting), and in fruit salads. They have real merit, are very easily made, use low-priced fruit, and if shredded pineapple is anything by which to judge, they have real commercial possibilities.

The World Trade in Petroleum.

World consumption of petroleum has increased remarkably during the last few years. American production has grown from less than 1,500,000,000 gallons in 1914 to over 8,950,000,000 gallons in 1924, an increase of 500 per cent., while her exports of petroleum have risen during the same period to nearly six times the volume of the 1914 shipments—from 217,570,941 gallons in 1914 to a record figure of 1,219,474,374 gallons in 1924. With the rapid development of the use of motor cars and of internal combustion engines for other purposes, the trade in petroleum, both in America and abroad, may be expected to continue to expand.

The value of American petroleum exports in 1924 amounted to more than $160,000,000, constituting an important item in her total merchandise exports during that year. Production of petroleum abroad, while not comparable with the output in the United States, has also shown a rapid growth. An interesting fact is that continental United States uses approximately 79 per cent. of the total world petroleum consumption, which figure corresponds very closely to the American percentage of the total world motor vehicle registration. Another significant fact which shows the relative importance of the United States in the petroleum industry is that the next largest consumer of petroleum, the United Kingdom, requires annually a quantity of petroleum equal to only about 7 per cent. of the American demand, while the total annual consumption in China, for example, is equivalent to about eight hours' supply in the United States.

Outside of the United States, the countries which manufacture petroleum from locally-produced crude petroleum in sufficient quantities to supply all or a large part of the domestic demand and leave a surplus for export are Mexico, Peru, and Trinidad, in the Western Hemisphere; Russia, Poland, and Rumania, in Europe; and India, Persia, the Dutch East Indies, and British Borneo (Sarawah), in Asia. Venezuelan oil is refined to an increasing extent in the country, but a larger proportion is exported as a crude oil, chiefly to Curacao (Dutch East Indies) for refining, and the refined products are exported from that point. Columbia produces from domestic crude sufficient petroleum for practically all the country's requirements, but as yet, at least, has not developed an export trade in this product.

Countries which produce petroleum from domestic crude oil in sufficient quantities to supply a part of the local requirements, but without a supply available for export to any extent, include Ecuador, Argentina, and Japan, and to a lesser degree (in proportion to consumption) France, Italy, Canada, and Czechoslovakia. A domestic refining industry operating largely or entirely on imported crude oil, and supplying petroleum to the domestic market, has been established in Englinad, Canada, Austria, Hungary, Curacao, and Australia.

Wool Growing in a Hurry.

At a meeting of sheep breeders at Chester (England) recently, Professor Barker, head of the Textile Department of Leeds University, described how a Japanese doctor had just placed upon the market a fluid which, injected into the veins of a sheep, promoted the rapid growth of wool. So rapid, indeed, was the growth said to be that two months with the injection would be equivalent to twelve months without the injection, and two or three shearings of wool per year were thus at least thinkable.

Inoculation was in the air at present, said the professor, and the University of Leeds proposed to test this Japanese idea. Although it might be laughed at, it might perhaps have to be treated seriously.

The Value of Purebred Pigs.

The great value of purebred stock is that it breeds comparatively true to type. A first cross is often a superior individual (writes Dr. G. F. Finlay, late Director, Animal Breeding Research Department, Edinburgh University), but it fails to transmit its excellence to its offspring. Prepotency or marked tendency to impress individual or breed characteristics on offspring is a quality possessed by pure breeds. When purchasing a boar, always give preference to one in whose family fertility is a pronounced feature.

When close line breeding or inbreeding is strictly adhered to, the strain becomes remarkably uniform, but in some cases uniformity has been obtained at the cost of constitution and prolificacy. If two strains which differ in their blood lines are crossed, the result is generally larger litters, and youngsters that possess a stronger and more vigorous constitution.

The progeny of a cross-mating between two pure breeds can be expected to be very uniform in type, but if these crossbred pigs are used for breeding, the next generation will consist of very mixed types. Breeding from crossbred pigs is therefore to be discouraged.

Tuberculosis—Control Measures.

It is safe to say, remarks a writer in the "Scottish Journal of Agriculture," that were bovine tuberculosis a disease of more spectacular symptoms, and were its onset more rapid and its losses more quickly evident, measures against it would long ago have been more drastic, and better progress would have been made toward eradication.

As an economic problem for agriculture, bovine tuberculosis is a serious matter. The loss in actual deaths may not be very noticeable, but affected animals fall away in condition and require more food to keep them going and to fatten them. The amount of milk they give is lessened. Their calves, which are born free of the disease (except less than 1 per cent. born tuberculous), do not long remain unaffected, and do not thrive as they would if they remained healthy. The carcass of infected animals may be partly or wholly unfit to be passed for human consumption. The disease in cattle is a fruitful source of tuberculosis in pigs, of which 10 per cent. are believed to be tuberculous in Britain.

There is no practical method of treatment of tuberculosis in animals, but by attention to the following precautions the disease may be kept under control:—

1. As cattle are the main source of infection, the tuberculin test should be applied to the herd and all reactors removed.
2. Do not allow pigs to roam about pastures and yards used by cattle unless it is definitely known that there is no tuberculosis in the herd.
3. All skim milk and other dairy products should be heated to 180 degrees Fahr., and kept at that temperature for fifteen minutes before being fed to pigs.
4. All refuse, slaughter-house offal, and similar food should be boiled before it is given to pigs.
5. Where tuberculosis is found to be present in the herd, all suspected animals should be slaughtered, and where this is done under qualified supervision the carcasses which have only a slight infection of the head glands will be passed for human consumption, the affected parts only being condemned. The pens should be thoroughly disinfected and limewashed, disinfectant being added to the lime. All litter and rubbish in the yards should be burned and the ground loosened and treated with quicklime.

Fresh air and sunlight are great enemies of the tubercle bacillus; hence pens and sties should be open and airy, and have no damp, dark corners to which the air and sun cannot penetrate.

Maize—Lateness-of-Cultivation Trials in the South.

The general practice in coastal districts of New South Wales in the after-cultivation of maize is to clean out the middles with a single-horse cultivator shortly after the maize has been hilled. One of the critical stages in the growth of the maize plant, determining the difference between good and poor yields, is during the tasselling period. It is thought by some that by continuing cultivation up to tasselling time—by maintaining the mulch and holding weed growth in check—it is possible to conserve more moisture, which will ultimately result in increased yields. To compensate for the extra cultivations it would be necessary for the increase to be sufficiently large to cover all costs incurred and show a reasonable profit. It is to be expected that the most striking results will be obtained in seasons when the rainfall has been good during the early stages of growth but deficient during the tasselling period. It was to compare the two systems and obtain definite information as to which will result in the more profitable returns that a series of lateness-of-cultivation trials were commenced at Grafton Experiment Farm (N.S.W.) in 1919.

The experiment occupied a permanent site, on black alluvial soil, fairly typical of the alluvial soils of the Clarence, and was laid out as follows:—

Plot 1.—Given as many cultivations as necessary to tasselling.

Plot 2.—Given one cultivation only after hilling.

Plot 3.—Given as many cultivations as necessary to tasselling.

In each season the experiment was planted during November with the early-maturing variety Leaming. The rate of seeding was uniform throughout—namely, three grains every 32 inches, sown in rows 4 feet apart, which is equivalent to 8 to 9 lb. of seed per acre. All cultivations previous to sowing were uniform, and such as to place the land in good order at planting time.

The results over five seasons show an average increase of 4 bushels 7 lb., valued at 14s. 9d., by adopting the practice of continuing cultivation up to tasselling. In only one year was the yield decreased, and that when the cultivation was not carried out until some time after tasselling. The increases, though not large, were sufficient to cover all costs and show a profitable margin.

"The advisability of continuing cultivation to tasselling will depend mainly on seasonal conditions, the growth of the crop, and the condition of the soil," concludes the experimentalist at the farm. "No hard-and-fast rule can be laid down, but the best results are likely to be obtained on soils that have a tendency to cake badly, or in seasons when the early part of the growing season has been good, followed on by dry weather at tasselling. On light soils well supplied with humus the soil will have a tendency to be self-mulching, and extra cultivation may not help to increase the yield to any appreciable extent. Under favourable conditions a variety may sucker freely and produce a profuse succulent growth, completely shading the soil, thereby giving rise to such a condition that any extra cultivation would be unnecessary."

Careful Handling in Haymaking.

It has been proven quite conclusively that the time of cutting of the various forage plants for hay purposes plays a very important part in both the total amount and the palatability of the nutrients obtained. A fact that does not appear to be so widely recognised (writes G. P. McRostie, in the Canadian departmental publication "Seasonable Hints") is that, even though a forage crop may be cut for hay at the proper time, the subsequent method of handling may result in serious losses. A preliminary report on investigations by the Forage Plant Division at the Central Experimental Farm indicates the reason for at least some of the losses. The tests were made during the harvesting of variety tests of various types of grasses and clovers, seeded both alone and in combination.

Either the whole or a definite portion of the cut fodder as harvested was placed on tarpaulins to dry. The material was handled very carefully during the curing process, at least with as little rough usage as it would be likely to receive under ordinary haying operations. After the curing process had been completed the hay was lifted off the tarpaulin and both it and the shattered portion remaining on the tarpaulin carefully weighed. This latter portion was computed as percentage loss during the curing operation.

The greater portion of the shattered material consisted of leaves, mixed with which was a small amount of the finer stems and a few heads. In the case of the clovers, lucerne and sweet-blossomed sweet clover lost about 7 per cent. during the curing process. Red clover and yellow-blossomed sweet clover lost a little over 5½ per cent., while the alsike and white Dutch clovers lost a somewhat smaller percentage. With the grasses, either alone or in combination, the loss fell to about 3½ per cent. The seeding of grasses with the various legumes in all cases reduced the percentage loss due to shattering.

Rougher treatment of the harvested fodder during curing, or allowing it to lie in the swath until the leaves were quite dry increased the losses due to shattering to an alarming extent, as much as 90 per cent. of the leaves being lost in the case of white-blossomed sweet clover. "When we consider that the leaf is not only the most palatable portion of the various grasses and clovers, but contains a considerably higher percentage of protein than the stems, the necessity of preventing such losses should be apparent."

The following practices are recommended as helping very materially in preserving the original food value during the curing process:—

(1) Get the hay into swaths or cocks before the leaves become dry enough to shatter.

(2) In showery weather cut only limited quantities, and get this cocked up as soon as possible.

(3) Handle as little and as carefully as circumstances will allow.

Closing of the Cotton Harvesting Season.

In connection with the 1924-25 cotton crop, the Department of Agriculture and stock officially announces that the season is now closed and no further seed cotton is to be consigned to the ginneries.

The attention of growers is drawn to the fact that all cotton plants which are the first growth after planting should have been either destroyed or cut down to within 6 inches of the ground level and the debris destroyed; and all cotton plants which are not of the first growth after planting should have been destroyed ere this.

New Method of Preserving Fruit.

A method of preserving fruit so that it will withstand a journey of several weeks in the hold of a ship without refrigeration is said to have been discovered by a London chemist, Mr. Alan Speedy.

The method consists of dipping or spraying the freshly-picked fruit with a chemical solution; the fruit is then drained and dried, when an invisible coating forms round it which prevents transpiration and keeps it in a perfectly natural condition even at semi-tropical temperatures.

The full bouquet and flavour, as well as the colouring are, it is claimed, preserved in their entirety. The advantage of the method lies in the fact that the impermeable coating is non-poisonous and tasteless, so that the fruit can be eaten just as it arrives from shipment.

It is well known that refrigerated or cooled fruit, after unloading, often becomes bad very quickly on regaining the normal temperature. This, says Mr. Speedy, is not the case under his method, while the cost of the preparation is negligible.

Inquiries concerning the process are being made by the Commonwealth Department of Markets and Migration.

Motor Transport and Rural Life.

Motor transportation has revolutionised the life of the farm, given employment to hundreds of thousands in the automobile and allied industries, and formed a new unit in the transportation systems of the country, are points stressed in the report of the American Committee on Highway Transport submitted to the third biennial conference of the International Chamber of Commerce, opened in Brussels on 21st June.

"Motor transportation has brought the town and country into closer touch," the report declared. "It has in a considerable degree destroyed the historic isolation of the farm and farmer. It has permitted a notable extension in educational facilities available for rural populations. The centrally located school reachable by motor transportation from a large surrounding area has largely contributed to the solution of the problem of adequate equipment and adequate instruction for the rural children."

On the 6,500,000 farms of the United States there were, in 1924, automobiles to the number of 4,200,000, making the total of automobiles in use by farmers almost equal to two-thirds of the number of farms in the country. Added to these, 370,000 motor trucks were utilised by farmers. The farmer possessing motor equipment has quadrupled the economic range of his choice of markets, enabling him to take advantage of more favourable prices at a greater distance, the committee pointed out.

Marketing and distributing practices have undergone great changes through the use of the motor car, was another feature brought out in the report.

What becomes of the Consumer's Dollar.

The United States Bureau of Agricultural Economics has made several studies to determine what becomes of the consumer's dollar spent for various commodities, one of which is cotton cloth. In its study of the distribution of the price of cloth, the bureau gathered prices at four stages of the path from the grower to the consumer:—(1) Price paid by consumer for cloth at the store; (2) price paid by jobber to mill's selling agent; (3) price of cotton in New Orleans market; and (4) price received by the grower. It is pointed out, however, that these do not represent all the agencies through whose hands the commodity passes.

The division of the consumer's dollar spent for various kinds of cotton cloth was found to be as follows:—

DISTRIBUTION OF CONSUMER'S DOLLAR SPENT FOR VARIOUS KINDS OF COTTON CLOTH.

Charge or Margin.	Sheeting.	Gingham.	Percale.	Calico.
Retailer .. .. Jobber .. .. Transportation of cloth from jobbing centre to retailer	$0·365	$0·281	$0·350	$0·296
Bleaching and printing	..	..	..	·177
Selling agent .. .. Manufacturer .. .. Cotton dealer .. .. Miscellaneous handling and carrying charges	·393	·534	·416	·288
Transportation from New Orleans to New England	·013	·010	·013	·014
Miscellaneous assembling charges ..	·031	·024	·020	·021
Cotton grower	·198	·151	·201	·204
Total	1·000	1.000	1·000	1·000

America Claims New Packing Methods add Millions to Returns.

Improved packing methods are adding millions of dollars annually to the sales of American products abroad, declared the Acting Chief of the United States Bureau of Foreign and Domestic Commerce recently. The bureau has been conducting a campaign to bring about better packing methods, and reports show that it is having a beneficial effect.

In order that American goods may arrive at foreign ports in first-class condition and maintain the standard of excellence which is desired for them, officials of the United States Government have been stressing upon manufacturers and exporters the necessity of packing properly.

The Department of Commerce has made a careful scientific study of the methods of packing to be employed for all kinds of products and for all kinds of conditions. This study covers practically every article of merchandise. Not only were tests made as to the carrying quality of different kinds of containers, but climatic and port conditions in various parts of the world were taken into careful consideration in the recommendations which have been prepared by the Department of Commerce.

A large part of the work in this investigation was conducted in co-operation with the Forest Products Laboratory, which made exhaustive tests into the strength of boxes and barrels of various shapes and sizes and made of different kinds of wood.

The millions of dollars lost annually through careless or injudicious packing, which invites pilferage and destroys goods through breakage or other damage, is a tax on industry which all those sharing in the distributive process should join forces to eliminate, says the official.

Packing which will be satisfactory for one country or destination, it is pointed out, may not be suitable for another, it being obvious, for instance, that shipments destined to a port with modern facilities and equipment will not always require the same character of container or internal packing as would a similar shipment which is discharged where port facilities either do not exist at all or are of a primitive character.

Feeding Young Pigs—Six Basic Principles.

One has but to visit a few farms (writes E. W. Crampton, Macdonald College, Canada) to be convinced that there is no one best way to feed little pigs. No two feeders follow the same plan, but all successful feeders recognise and observe certain fundamental principles. These may be summarised as follows:—

1. The first food given to the pig should be as nearly like his dam's milk as is possible.
2. The change from this to the ultimate fattening ration must be made gradually and slowly.
3. A minimum of fibre is essential in the early rations.
4. All pigs should be eating freely from the trough before being weaned.
5. A little pig should always be hungry at feeding time. (This is the best preventive of overfeeding.)
6. Small pigs should be fed at least three times a day.

If the principles are adhered to it matters but little what the detail of the practice is. For pigs of this size it is impossible to lay down set rules for feeding. This is where the skill of the feeder enters in. It is an art to feed young pigs—an art which must be learned in the farmyard, not from books.

Co-operative Marketing in Canada.

Queensland co-operators will be interested in the development of co-operative marketing in Canada, as disclosed in a report on the Co-operative Marketing of Agricultural Produce in Saskatchewan, by the Officer in Charge for H.M. Trade Commissioner at Winnipeg. Wool marketing in Saskatchewan was commenced by the Co-operation and Markets Branch of the Department of Agriculture, but as soon as the commodity reached a stage where it was good business to establish a co-operative organisation managed by the farmers themselves that was done, and now the Canadian Co-operative Wool Growers, Ltd., operates over Canada. This company handles fully 50 per cent. of the wool produced in Western Canada, and, with its warehouses at suitable points, is in an excellent position to give service to its shareholders. The head office in the West is at Regina, and during the past season it handled approximately 434,764 lb. in the Provinces of Manitoba and Saskatchewan. The company handles for the farmers stockmen's supplies, such as shearing machinery, branding fluid, &c., and also carried a considerable range of Canadian woollen piece-goods and knitted wear for the benefit of its shareholders and customers.

The latest report issued by the Dominion Co-operation and Markets Branch gives the following particulars in regard to the establishment of the Provincial Co-operative Stockyards:—In 1918 the Provincial Legislature took steps to establish two central live stockyards at Moose Jaw and Prince Albert. One-third of the cost of the buildings erected was paid by the Government when evidence was furnished that the company possessed enough paid-up capital to furnish the other two-thirds. These stockyards have become two of the most complete yards in Western Canada for feeding and handling stock. During 1923 these yards, in addition to live stock handled through ordinary trade channels, received 231 carloads of live stock from co-operative associations.

At the Annual Convention at Saskatchewan Grain Growers' Association, held in Regina at the end of January, the principle of establishing a live stock pool was endorsed in a resolution, and eight agricultural and stock breeding organisations are to discuss with the grain growers the question of the organisation of a cattle pool. Hitherto shippers of live cattle have made use of the cattle pool organised by the United Grain Growers, Ltd., a farmers' co-operative organisation with headquarters at Winnipeg. In 1923 this pool handled 64,195 head of cattle.

A pool was organised at the end of 1924 by the Co-operation and Markets Branch of the Department of Agriculture, in conjunction with the Saskatchewan Grain Growers' Association, for the co-operative marketing of turkeys. Sixteen carloads of turkeys were marketed in all by this method, and results are considered to have been so satisfactory that plans are being made for the permanent organisation of a general poultry pool.

In 1923 a co-operative egg pool was organised by the Saskatchewan Co-operative Creameries, and approximately 58,000 dozen eggs were marketed. A movement, however, is now on foot, sponsored by the Department of Agriculture and the Saskatchewan Grain Growers' Association, to organise a voluntary egg pool in connection with the proposed poultry pool mentioned above, and this is expected to come into being during the present year.

Lucerne in the Stack.

Lucerne hay, under some circumstances, is liable to become so heated in the stack that firing occurs, and the hay is reduced to ashes. In other cases heat is generated, but is not sufficient to cause firing, and the hay is only charred. The degree of charring varies according to the temperature reached, and in some cases is so slight that the hay is not materially damaged, while in other cases it may be so great that the hay is rendered practically valueless as feed.

The direct causes of spontaneous combustion are rather obscure, as also are the conditions which are conducive to its development. As a rule, however, it is found to occur in hay which has been made from heavy, sappy crops, especially if it is made when the weather is not suitable for drying. Great difficulty is experienced in getting the moisture out of very green lucerne, and even when the stuff is apparently dry, charring or combustion may occur. When the crop is very sappy, and the weather not favourable to drying, the hay should be put up in narrow cocks, and left in the field until no trace of moisture can be detected. Generally it is the first cutting of the season which causes the trouble, as it grows during cool weather and contains a larger percentage of moisture than later cuts. Extra care should be taken with this, and, if necessary, the hay stacked outside and away from sheds or barns, so that, should combustion occur, these will not be destroyed.

Downy Mildew—A Seasonable Reminder.

Since the first outbreak of downy mildew in Australia so much has been written and said regarding the disease and its treatment that viticulturists may consider they have had a surfeit on the subject; but, after witnessing the results of last season's vintage (chiefly due to the ravages of the disease), and the failure of many growers to realise the gravity of the menace (as shown by their neglect to spray consistently), it appears necessary to again broach the subject with a view to once more driving home the necessity for spraying, and at the same time to point out the advisability of including the operation of spraying in the general routine of vineyard work.

The weather conditions experienced last season were ideal for downy mildew development, and it was very noticeable that where spraying had been neglected crops were very poor and very little was vintaged from such patches. In the Hunter River district the necessity for spraying was particularly evident, and in this district the vintage was probably 70 per cent. short of expectations early in the season, mainly the effect of the disease. Growers who sprayed as they should have done had a fair vintage. On the other hand, those who did not spray vintaged practically no crop at all, and what was picked was inferior stuff and consequently yielded poor quality wine. The same applies more or less to other parts of the State.

It would probably be right to say that, owing to the ravages of downy mildew—or, to be more correct, owing to the neglect of many growers to spray consistently—the vintage figures for the State were reduced by 40 per cent.

It must be realised that not only is the crop at stake by not spraying, but that what may be harvested from a badly affected vineyard will make a poor-quality wine. The worst feature of wine made from grapes badly affected with mildew is that it causes the cellarman a great deal of trouble and anxiety in handling, and one cannot blame buyers who refuse to purchase either grapes affected with the disease or wine made from such grapes.

It is quite probable that the State, after experiencing a wet winter, may see a dry summer, and in that case there will be little or no trouble from this disease; but in dealing with downy mildew preventive measures should at all times be resorted to, and hence the advisability of spraying as an insurance—at all events, in the early part of the season. Further spraying can be undertaken later as it appears necessary.—Viticultural Expert, New South Wales Department of Agriculture.

Some Points about Wells.

Wells are of two kinds—shallow, or surface wells, and deep wells. Shallow wells are those which are sunk into superficial porous beds of sand or gravel overlying an impermeable stratum, such as clay or rock, by which the underground water is held up. It is possible to obtain satisfactory water from shallow wells, provided there is no possibility of pollution by soakage from surface washings, and the necessary precautions are observed with regard to position and construction. It is frequently found that not sufficient care is exercised in selecting a site for a shallow well; therefore the water from these wells should always be looked upon with suspicion until careful investigation has proved that there are no possible sources of contamination. The underground water tapped by these wells is

comparatively near the surface. Liquid sewage and other matter passing into the soil may easily reach this water in an unpurified state, and without efficient filtration it would be dangerous to use the water for domestic purposes.

As a rule, the ground water is slowly but steadily moving through the soil towards its natural outlet. This is of importance with regard to the position of the well. Should the well be above any possible source of contamination—that is, in such a position that the ground water flows from the well towards the possible source of contamination—the risk of pollution of the water in the well is generally diminished. The position of the well, however, cannot always be relied upon as safeguarding the water from pollution. If a large amount of water be abstracted from the well at any time, considerable depression of the water-level may take place, and thus cause a flow of water towards the well from all directions, including that in which the source of contamination lies. In these circumstances the water in the well would be liable to pollution.

Deep wells are defined as those sunk to considerable depths and which pass through a superficial porous bed and an underlying impermeable stratum to reach water-bearing strata below. The water tapped by deep wells has usually travelled a great distance since it reached the surface of the earth as rain. It is protected from pollution from the soil above by the impermeable stratum. Such water, though it may sometimes be hard, usually forms a safe source of water supply.

The lining of all wells should be so constructed as to be quite impervious to soakage from the surface surroundings. Instead of the brickwork being loosely laid around it, which is the common practice, it should be set in cement down to the water-level, and as an additional precaution, it is well to interpose a layer of puddled clay all around between the brickwork and the adjoining soil. A more satisfactory plan, where possible, is to substitute Monier pipes in place of the bricks, carefully cementing the joints between each length of piping. The piping should protrude above the ground a foot or two to form a coping to prevent surface washings entering the well.

The Royal Society of Queensland.

The ordinary monthly meeting of the Society was held in the Geology Lecture Theatre of the University on Monday, 28th September, 1925. The President, Prof. R. W. Hawken, B.A., M.E., M. Inst. C.E., in the chair. Messrs. E. J. Ferguson Wood and N. L. Kelly were unanimously elected as Associates. On the motion of Mr. Chas. Hedley, seconded by Prof. H. C. Richards, it was decided to ask the Government to reserve for scenic purposes some of the areas of rain forest adjoining the railway between Cairns and Cardwell. It was suggested that the Society might seek the support of the Queensland Naturalists' Club and other interested institutions in furthering the object of the motion.

Prof. H. C. Richards exhibited a meteorite found about 80 miles from Boulia, Western Queensland, and forwarded to him by the shire clerk of Boulia. It is composed chiefly of coarsely crystalline iron which indicated slow cooling under great pressure.

A paper by Dr. H. I. Jensen entitled "Geological Features of the Mandated Territory of New Guinea" was read by the Hon. Secretary in the absence of the author. The paper places on record some of the essential facts of the geology of the Mandated Territory and adjacent islands. The author states that he is in agreement with Rev. C. H. Massey in his general contention that the islands of New Guinea form the remains of a broken-up continent. Dr. Jensen concludes that up to the Cretaceous period New Guinea, the surrounding islands, the Coral Sea, and possibly New Caledonia formed a continental mass continuous with North Queensland and Central Australia. Prof. Richards, Dr. Whitehouse, Messrs. Owen Jones, D. Herbert, C. T. White, F. Bennett, and Prof. Goddard took part in the discussion on the paper.

Mr. C. T. White read a paper by himself and Mr. W. D. Francis entitled "Contributions to the Queensland Flora, No. 3." The following new species are described and figured:—*Polycarpæa glabra, Melicope stipitata, Elæodendron microcarpum, Cassia neurophylla, Polyosma rhytophloia, Xanthostemon Youngii, Sideroxylon singuliflorum, Prostanthera megacalyx, P. suborbicularis, Cryptocarya corrugata,* and *Grevillea sessilis.* In addition, the paper contains descriptions of two new varieties, records of fourteen species not previously known as Queensland plants, descriptions of flowers or fruit of species of which only fruit or flowers were previously described, and definite locality records of a number of rare native plants. Prof. Goddard and Messrs. Bennett and Herbert took part in the subsequent discussion.

Orchard Notes for December.

THE COASTAL DISTRICTS.

The planting of pineapples and bananas may be continued, taking care that the ground is properly prepared and suckers carefully selected, as advised previously in these Notes. Keep the plantations well worked and free from weed of all kinds, specially if the season is dry. New plantations require constant attention, in order to give young plants every chance to get a good start; if checked when young they take a long time to pull up and the fruiting period is considerably retarded. Small areas well worked are more profitable than large areas indifferently looked after, as the fruit they produce is of very much better quality. This is a very important matter in the case of both of these fruits, as with the great increase in the area under crop there is not likely to be a profitable market for inferior fruit. Canners only want first-class pines of a size that will fill a can, and cannot utilise small or inferior fruit, except in very limited quantities, and even then at a very low price. Small, badly filled bananas are always hard to quit, and with a well-supplied market they become unsaleable. Pineapple-growers, especially those who have a quantity of the Ripley Queen variety, are warned that the sending of very immature fruit to the Southern markets is most unwise, as there is no surer way of spoiling the market for the main crop. Immature pineapples are not fit for human consumption, and should be condemned by the health authorities of the States to which they are sent.

Citrus orchards require constant attention; the land must be kept well worked and all weed growth destroyed. Spraying or cyaniding for scale insects should be carried out where necessary. Spraying with fungicides should be done where the trees show the need of it. A close lookout must be kept for the first indications of "maori," and as soon as it is discovered the trees should either be dusted with dry sulphur or sprayed with the lime-sulphur, potassium, or sodium sulphide washes. Borer should be looked for and destroyed whenever seen.

Early grapes will be ready for cutting. Handle carefully, and get them on to the market in the best possible condition. A bunch with the bloom on and every berry perfect will always look and sell well, even on a full market, when crushed and ill-packed lines are hard to quit.

Peaches, plums, papaws, and melons will be in season during the month. See that they are properly handled. Look out for fruit fly in all early ripening stone fruit, and see that none is left to lie under the trees to rot and thus breed a big crop of flies to destroy the mango crop when it ripens.

Keep leaf-eating insects of all kinds in check by spraying the plants on which they feed with arsenate of lead.

Look out for Irish blight in potatoes and tomatoes, and mildew on melons and kindred plants. Use Bordeaux or Burgundy mixture for the former, and finely ground sulphur or a sulphide spray for the latter.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Early ripening apples, plums, apricots, peaches, and nectarines will be ready for marketing during the month. They are unsatisfactory lines to handle, as the old saw, "Early ripe, early rotten," applies to all of them; in fact, the season of any particular variety is so short that it must be marketed and consumed as quickly as possible. All early ripening deciduous fruits are poor carriers and bad keepers, as their flesh is soft and watery, deficient in firmness and sugar, and cannot, therefore, be sent to any distant market. The available markets are quickly over-supplied with this class of fruit, and a glut takes place in consequence. Merchants frequently make the serious mistake of trying to hold such fruits, in the hope of the market improving, with the result that, instead of improving, the market frequently becomes more and more congested, and held-over lines have to be sent to the tip. There is only one way to deal with this class of fruit, and that is to clear the markets daily, no matter what the price, and get it distributed and into consumption as rapidly as possible by means of barrowmen and hawkers. Most early ripening fruits are useless for preserving in any way, their only value being what they will bring for consumption whilst fresh. This being so, it is only a waste of time and money to forward immature, undersized, and inferior fruit to market, as it is not wanted, and there is no sale for it. It should never have been grown, as it is frequently only an expense to the producer, besides which, unless the fallen or over-ripe fruit is regularly and systematically gathered and destroyed in the orchard, it becomes a breeding ground for fruit fly and codlin moth, as well as of fungi, such as those producing the brown and ripe rots. Early ripening fruits should, therefore, be carefully graded for size and quality, handled, and packed with great care, and nothing but choice fruit sent

to market. If this is done, a good price will be secured, but if the whole crop—good, bad, and indifferent—is rushed on to the local markets, a serious congestion is bound to take place and large quantities will go to waste.

Orchards and vineyards must be kept in a state of perfect tilth, especially if the weather is dry, so as to retain the moisture necessary for the development of the later ripening fruits. Where citrus fruits are grown, an irrigation should be given during the month if water is available for this purpose, excepting, of course, there is a good fall of rain sufficient to provide an ample supply of moisture.

Codlin moth and fruit fly must receive constant attention and be kept under control, otherwise the later-ripening fruits are likely to suffer severely from the depredations of these serious pests.

Grape vines must be carefully attended to and sprayed where necessary for black spot or downy mildew, or sulphured for oidium. Where brown rot makes its appearance, spraying with the potassium or sodium sulphide washes should be carried out. Leaf-eating insects of all kinds can be kept in check by spraying with arsenate of lead.

Vegetables will require constant attention in the Granite Belt area. Tomatoes and potatoes will require to be carefully watched in order to prevent loss from Irish blight, and no time should be lost in spraying these crops should this disease make its appearance in any part of the district, as it can be prevented by spraying with either Bordeaux or Burgundy mixture. These fungicides effectually protect the plants to which they are applied if used in time. If leaf-eating insects, such as beetles, grasshoppers, and caterpillars, are doing damage as well, add 3 or 4 lb. of arsenate of lead to the 100 gallons of spraying mixture used for the prevention of early and late blight (potato macrosporium and Irish blight), so that the one application will be effectual for both classes of diseases.

Keep all kinds of vegetables well worked, stirring the land frequently to retain moisture, and taking care to prevent the formation of a surface crust should rain fall. Remember that vegetables require plenty of moisture; therefore leave nothing to chance, but do your best to retain all the moisture in the soil you possibly can.

Farm and Garden Notes for December.

Although November is regarded generally as the best period for planting the main maize crop, on account of the tasselling period harmonising later on with the summer rains, December planting may be carried out in districts where early frosts are not prevalent, provided a known quick maturing variety of maize is sown.

To ensure a supply of late autumn and winter feed, dairymen are advised to make successive sowings of maize and sorghums, to be ultimately used either as green feed or in the form of silage. The necessity for such provision cannot be too strongly urged. Farmers who have not had any experience in building an ensilage stack can rest assured that, if they produce a crop for this purpose, information and instruction on the matter will be given on application to the Under Secretary for Agriculture and Stock; also that, whenever possible, the services of an instructor will be made available for carrying out a demonstration in ensilage-making for the benefit of the farmer concerned and his immediate neighbours.

In districts and localities where supplies of lucerne are not available, sowings of cowpeas should be made, particularly by dairymen, as the lack of protein-yielding foods for milch cows is a common cause of diminished milk supplies and of unthriftiness of animals in dairy herds. Cowpeas and lucerne can be depended upon to supply the deficiency. The former crop is hardy and drought-resistant. When plants are to be used as fodder, it is customary to commence to feed them to stock when the pods have formed. Animals are not fond of cowpeas in a fresh, green state, consequently the plants should be cut a day or two before use. Economy is effected by chaffing beforehand, but the plants can also be fed whole. Chaffed in the manner indicated, and fed in conjunction with green maize, or sorghum, when in head, in the proportion of one-third of the former to two-thirds of the latter, a well balanced ration is obtainable. Animals with access to grass land will consume from 40 to 50 lb. per head per day; a good increase in the milk flow is promoted by this succulent diet. The plant has other excellent attributes as a soil renovator. Pig-raisers will find it invaluable also.

A great variety of quick-growing catch crops, suitable for green fodder and ensilage purposes, may also be sown this month, notably Sudan grass, white panicum, giant panicum (liberty millet), Japanese millet, red and white French millet. Well prepared land, however, is required for crops of this description, which make their growth within a very limited period of time. French millet is particularly valuable as a birdseed crop, the white variety being more in favour for this purpose.

Successive sowings may be made of pumpkins, melons, and plants of this description.

In districts where onions are grown, these will now be ready for harvesting. If attention is given, in the case of garden plots, to bending over the tops of the onions, maturity of the crop is hastened. Evidence will be shown of the natural ripening-off process, and steps should be taken to lift the bulbs and to place them in windrows until the tops are dry enough to twist off. If a ready market is not available, and it is decided to hold over the onions for a time, special care should be taken in handling. Storage in racks in a cool barn is necessary, otherwise considerable deterioration is to be expected. Improved prices are to be looked for in marketing by grading and classifying produce of this description.

Cotton areas which were subjected to a thorough initial preparation, thereby conserving a sufficiency of moisture for the young plants, should now be making good headway and sending their taproots well down. Keep down all weed growth by scarifying as long as the growth will admit of horse work.

KITCHEN GARDEN.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown. All vacant ground should be well manured and dug two spits deep. Manure and dig as the crops come off, and the land will be ready for use after the first shower.

FLOWER GARDEN.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked layer beneath the loose soil. Alternate light with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulacca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top-dress all lawns.

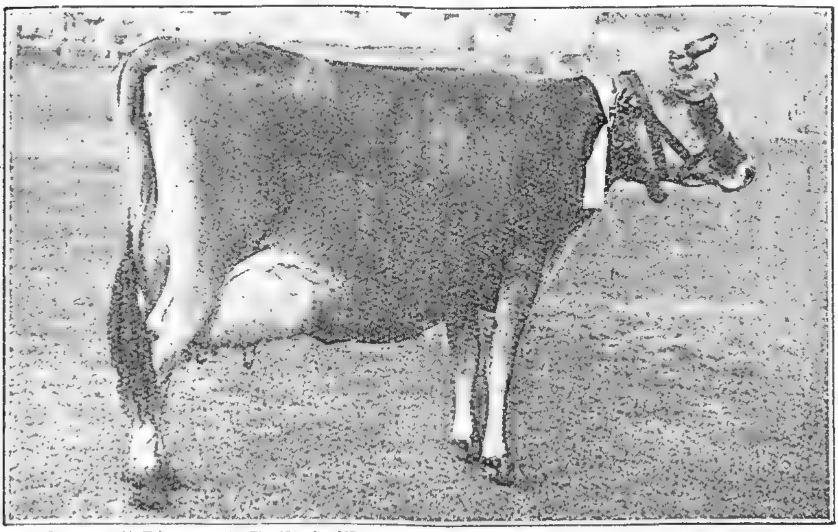


Photo.: "Livestock Bulletin."]

PLATE 139.—"CARLYLE LADY LYNN."

Second for Jersey Cow, five years and over, in milk; first in home milking with 2.53 lb. fat in twenty-four hours; first for cow or heifer not exceeding 800 lb. live weight, averaging the greatest daily yield of butter fat with 2.36 lb. in twenty-four hours. Winner of eight championships and numerous class prizes, including the home milking at the 1923 National. Owned by Mr. John Williams, Woodbine, Wondai.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. K. CHAPMAN.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

1925.	November.		December.		Nov.	Dec.
					Moonrise.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	5·3	6·9	4·50	6·32	6·35	7·16
2	5·2	6 10	4·50	6·32	7·32	8 9
3	5 1	6 11	4 50	6 33	8 29	8·59
4	5 0	6·11	4 50	6·34	9 25	9·45
5	5·0	6·12	4 50	6·35	10·17	10 29
6	4 59	6 13	4 50	6·35	11·5	11 8
7	4 58	6·13	4 50	6 36	11·49	11·45
8	4·57	6·14	4 50	6·37	nil	nil
					a.m.	a.m.
9	4 57	6 15	4 50	6·37	12·33	12 20
10	4 56	6 15	4 51	6 38	1·12	12·54
11	4 56	6·16	4 51	6 39	1·47	1 28
12	4 55	6 17	4 51	6 40	2·23	2 3
13	4·55	6 18	4 51	6 40	2 56	2·40
14	4 54	6 18	4 52	6·41	3 33	3 24
15	4 54	6·19	4 52	6 41	4 11	4·9
16	4 53	6 20	4 52	6 42	4 50	5·2
17	4 53	6 21	4·52	6·43	5·33	6 0
18	4 53	6 21	4 53	6·43	6 23	7·5
19	4 52	6·22	4·53	6·44	7 17	8·11
20	4·52	6 23	4 54	6 44	8 17	9·16
21	4·51	6 24	4·54	6·45	9·19	10 20
22	4 51	6 25	4 55	6 46	10·23	11·24
						p.m.
23	4·51	6 26	4·55	6 46	11·26	12·24
					p.m.	
24	4 51	6·27	4·56	6·47	12·28	1 23
25	4 51	6 28	4·56	6·47	1·29	2·19
26	4 50	6·29	4 57	6 47	2 29	3 16
27	4·50	6 29	4 57	6 48	3 27	4·12
28	4 50	6·30	4 58	6·48	4·25	5 7
29	4 50	6·31	4 59	6 48	5·22	6 0
30	4·50	6·31	5 0	6 49	6·20	6·52
31	...		5 1	6·49	..	7·40

Phases of the Moon, Occultations, &c.

9 Nov. ☾ Last Quarter 1 13 a.m.
16 „ New Moon 4 58 p.m.
23 „ ☽ First Quarter 12 5 p.m.
30 „ ○ Full Moon 6 11 p.m.

Apogee, 8th November at 5 36 a.m.
Perigee, 25th November at 5 36 p.m.

On the 20th November, about one hour after sunset, it will be interesting to notice that the planet Jupiter and the Moon, then nearly in its first quarter, will be apparently in somewhat close proximity in the western part of the sky. There will be, however, several millions of miles seperating the two objects as the Moon will be at a distance from the Earth of about 226,000 miles only, while Jupiter will be far away at a distance of about 700 millions of miles.

Mercury will be at its greatest elongation, 22 degrees 3 minutes east of the Sun, on the 22nd, when it will remain above the horizon 1 hour 42 minutes after sunset. The constellations in the same direction in the sky are Sagittarius and Scorpio, near the borders of which the planet will seem to be situated. As no bright stars are in the immediate neighbourhood Mercury should be clearly discernable, with Antaries the brightest star of Scopio about 15 degrees above it towards the Moon. On and about the 26th November the two most brilliant planets, Venus and Jupiter, will be apparently not very far apart in the western sky soon after sunset, with the constellation Sagittarius and Capricornus in the background. Although the Moon will be somewhat bright, being between the first quarter and full, the two principal stars of Capricornus which lie apparently somewhat remarkably close to one another should also be observable above these two planets.

On the 28th Venus will be at its greatest elongation 47 degrees 18 minutes east of the Sun, and therefore at its highest point above the western horizon after sunset. Venus will be apparently in the constellation of Sagittarius near Capricornus and will not set until 3 hours 32 minutes after the Sun.

8 Dec. ☾ Last Quarter 10 11 p.m.
16 „ New Moon 5 5 a.m.
22 „ ☽ First Quarter 9 8 p.m.
30 „ ○ Full Moon 12 1 a.m.

Apogee, 6th December at 4 6 a.m.
Perigee, 18th December at 12 18 a.m.

On and near the 1st December, about 8 o'clock in the evening, the Southern Cross will be at the lowest part of the circle which it apparently makes every twenty-four hours, also once every year around the South celestial pole, a point in the sky at the same distance above the Southern horizon as the position of the observer is from the equator. The Cross being at a distance of 30 degrees from the Pole, describe a circle 60 degrees in diameter. At Warwick, 28 degrees South, the pole is only 28 degrees above the horizon and the Cross therefore when at its lowest position is just below the southern horizon. This position is represented by Figure VI. on the clock face; about midnight the Cross will reach position VIII. and will be coming into view head downwards in a south-easterly position.

About midday on the 15th Venus will be occulted by the Moon, but only to a very small extent in Southern Queensland. As this will occur within four days of the new moon, a beautifully interesting phenomenon will be somewhat marred by the intense brightness of the Sun in too great proximity on the left.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

A Cross in this space is a reminder that your Subscription to the Journal expires with this number.

ANNUAL RATES OF SUBSCRIPTION.
Farmers, Graziers, Horticulturists, and Schools of Art FREE on prepayment of 1/- to cover postage. Members of Agricultural Societies, 5/-, including postage. General Public, 10/- including postage.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXIV. 1 DECEMBER, 1925. PART 6.

Event and Comment.

The Current Issue.

A valuable progress report of Banana Beetle Borer investigations by Mr. Froggatt is an important feature of the December Journal. The report is illustrated with some very fine plates the work of Mr. I. W. Helmsing, of the Division of Entomology and Plant Pathology. Comparative trials with ratoon and annual Upland cotton carried out by the department in 1924 are described by Mr. Evans. Mr. Wells has a note on cotton thinning and spacing experiments for the season 1924-25, and another on spinning tests of Queensland cotton. Agriculture in Queensland is further reviewed. Mr. Francis has some interesting observations on the plants of Charleville. Mr. Girault has a note on an imported lucerne pest, with a description of two allied species. He also supplies a descriptive note on the Australian Ophioninæ (*ichneumon—Flies*). The work of the Bureau of Sugar Experiment Stations is well covered in useful observations and reports. Other well-supplied features make up a number of more than usual interest.

The 1925 Wheat Harvest.

A recent inspection of the principal wheat-growing districts, by the Director of Agriculture (Mr. H. C. Quodling) for the purpose of studying the various influences affecting production, and at the same time to observe progress in the wheat improvement work of the Department in relation to the breeding and evolving of varieties suitable to Queensland conditions, has shown that there is a marked increase in the area cropped this season. Growers generally have also kept right up to date in the use of modern labour-saving machinery and slowly, but surely, a gradual improvement in methods of cultivation and in the varieties sown is evident. Altogether there is every reason for an optimistic opinion regarding the future development of the wheat industry in Queensland.

No country is free from seasonal set-backs, and nowhere in the world are producers in the happy position of enjoying an uninterrupted run of good crops and prosperity. This year in many localities dry weather and late frosts were responsible for reduced yields on low-lying and exposed country; luckily, however, the incidence of these unfavourable factors was not so pronounced elsewhere, with the result that average yields are good and many individual crops are of record dimensions. All this tends towards a full realisation of the Wheat Board's estimate of a 2,000,000 bushel crop.

Dry Farming.

If successful production were only a matter of good cultivation on scientific lines so that the land might be kept in a condition to receive the rainfall and to store moisture for the development of the ensuing crop, wheat-growing would become more popular—assuming, of course, that payable prices for grain are forthcoming. It has been clearly demonstrated by the dry farming experiments carried out at the Roma State Farm that the safer method to adopt—and this is equally applicable throughout the State—is to burn the stubble and start the cultivator to work immediately after the removal of one crop in preparation for the next. Plough at the first opportunity, where the soil requires ploughing, and keep the surface in a well-worked condition to maintain "a weed-free blanket mulch" to check the loss of soil moisture due to excessive evaporation. Proof of the soundness and efficiency of such a method was demonstrated some years ago by summer fallowing a field at the Roma Farm, and permitting practically all the rain which fell to percolate to the subsoil and holding it there by the method outlined for the benefit of the approaching crop. In this instance the effective rainfall during the growing period amounted to only 1.76 inches for a return of 24 bushels per acre. As it takes ordinarily about 4¼ inches of rain to pass through a crop to produce a 15-bushel yield, it is obvious that this greater return was only possible through conserving the summer rains. If this system were universally adopted there would be fewer disappointments on the score of reduced yields or crop failures through the incidence of dry weather.

Wheat-growing Essentials.

Personal contact with a number of producers has clearly shown that good judgment and experience in the matter of soil treatment and farming practice are as essential to success in wheat-growing as in any other forms of agriculture. One has to visualise a very wide perspective before attempting to arrive at the part taken by the wheatgrower in the general scheme of primary production. In the Southern States wheat-growing is often a full-time job; here, on account of certain climatic and soil advantages, not enjoyed by his Southern confrere, the grower of wheat on the Darling Downs may also be a very successful maizegrower and dairyman, or a producer of fodders, canary seed, barley, oats, lucerne, potatoes, or other minor crops; and if conditions permit he may combine sheep and lamb raising with wheat production. Obviously, this greater versatility in the matter of production calls for a very careful study of the conditions under which this cereal is grown, in order that officers of the department may render the most helpful service in assisting to build up and stabilise the industry. For example, the man who combines wheat and sheep, and this undoubtedly represents an excellent balance in the matter of economic production, finds that he is in a position to farm large areas with the aid of tractor-drawn implements and machinery. Given the necessary capital and equipment, a greater use can be made of heavy, black soil country of which there are almost illimitable areas still undeveloped on the Darling Downs.

The secret of working these deep, heavy black soils of the plains is to take advantage of their "self-working" capacity. Aeration and nitrification go on naturally; the tendency of the soil when contracting in dry weather is to fissure and crack to considerable depths. When rain falls, much of it percolates deeply into the subsoil and the whole mass of soil in process of expansion undergoes a perceptible movement, visible on the surface, where a natural mulch is formed. To attempt to plough soils of this character to any depth is to turn up rough, intractable lumps. Obviously, the "one way" and the "stiff shanked" cultivators are quite capable of accomplishing all the cultivation required for the production of a crop. As a matter of fact, this class of soil under ordinary circumstances does not require to be ploughed for wheat and is rich enough to produce heavy crops for many years to come without the aid of artificial fertilisers. Under such conditions the demand is for late maturing, good stooling wheat like "Currawa" and "Cleveland" for the main crop, which can be sown early, in April, and fed off at intervals until the beginning of August; a choice of favoured varieties for mid-season and spring sowing being made to suit individual requirements.

The farmer who combines dairying with wheatgrowing and is located on the more sheltered country on the ridges and slopes contiguous to the plains also favours

a proportion of slow maturing wheat, but in the generality of cases his selection includes a slightly greater percentage of mid-season and spring sown varieties.

The mixed farmer, with his more intensive methods of cultivation and crop rotations, has to be guided by seasonal conditions and other circumstances incidental to his operations, such as the time for sowing and ripening, the character of the season, and the situation and soil on which the wheat is to be planted, all of which exercise an influence in the matter of the choice of varieties. One important feature in the case of certain spring wheats is their capacity to make the best use of a limited amount of soil moisture for the production of a crop in the shortest possible time. These examples are mentioned merely to illustrate that a single variety of wheat cannot possibly be expected to meet the varying conditions and environment under which crops are to be grown over a planting season extending, say, from April to July.

Some Favoured Wheats.

At the present time no variety enjoys the popularity of ''Florence'' in the grain-growing districts of the Downs, or as a hay wheat in the coastal districts. It, however, suffered a good deal this year from frost on low-lying country. Growers, while agreeing as to its general excellence, complain of the loss through the tendency of the grain to shatter when ripe. As the present season may be regarded as a dry one, varieties which lodged badly last year—a wet one—and gave much trouble when harvested, stood up well this season and generally furnished good returns. Examples of these are ''Canberra,'' a reputed cross between ''Federation'' wheat and ''Volga'' barley, which returned thirteen bags per acre at Willowvale; and ''Gluyas,'' a South Australian selection from Ward's wheat, which proved a fairly consistent cropper, seven to nine bag crops being quite common. These two being mid-season varieties and slightly slower in development, were not affected by late frosts as much as ''Florence'' or other spring-growing wheats. Moreover, the former wheats benefited generally by the late rains. An example may be cited where crops of ''Canberra'' and ''Florence'' were grown side by side, the former returning thirteen bags and the latter five bags per acre.

The excellent yields and quality of grain obtained in previous seasons with ''Pusa No. 4,'' a spring wheat with a similar growing period to ''Florence,'' introduced about fifteen years ago by the department from India and brought into general cultivation after a series of tests extending over several seasons, were responsible for a fairly general sowing of the variety under rather varying conditions. Knowing ''Pusa'' to be susceptible to frost, careful observation was made respecting its behaviour when grown on different situations. Generally speaking, it was badly frosted on low-lying and exposed flats, and suffered, in common with ''Florence'' and other quick maturing wheats from this cause, and from the plants being too far advanced in growth when the late rains were experienced in October. However, on the slopes and higher lands ''Pusa'' exceeded expectations and proved its capacity to yield heavily, twelve and up to fourteen bag crops being not uncommon, with an occasional yield of fifteen bags per acre. This variety, clean this year, is somewhat liable to rust in wet seasons, but notwithstanding this drawback gave thirteen and fourteen bags to the acre last year when rust was prevalent. One feature can always be relied upon with ''Pusa''—it will fill and hold its grain and produce a plump, fairly bright sample even when badly rusted and subjected to a lot of wet weather at harvest time, and may be regarded as superior in these respects to any other variety at present in cultivation in the State.

Rust in Wheat.

Rust has a most important bearing on the future of wheatgrowing in Queensland. Resistant capacity of varieties must never be lost sight of. The department is keeping in close touch with this problem through its field staff and each season engages in comprehensive tests. Observation, Comparative Test, and Pure Seed Propagation Plots have been established in several districts, and these link the Wheat Breeding Farm at Roma with the prospective grower.

The Importance of Pure Seed.

Good reasons exist for advocating the general use for planting purposes of seed true to type and free from impurities, as wheats become readily intermixed. Obviously, the time to make seed selections is while the crop is ripening, when volunteer varieties can be removed.

Bureau of Sugar Experiment Stations.

SUGAR CROP PROSPECTS.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has returned from an inspection of the Experiment Stations at Meringa, South Johnstone, Mackay, and Bundaberg. The sugar districts of Cairns, Innisfail, and Tully were also visited.

Cairns.

The Cairns district was found to be somewhat dry during October, especially the Mulgrave and Gordonvale areas, and from a business point of view the town of Cairns was much depressed owing to the long-continued rotary strike of wharf labourers. The difficulty experienced in getting sugar shipped away had led to the building of large new sugar stores at Hambledon, Mulgrave, and Babinda. This was, however, only regarded as a temporary expedient as the holding of large stocks of sugar at the mills is not favoured, because, if accumulations occur owing to difficulty in shipping, an early wet season would have an extremely prejudicial effect on stored sugar. A very bitter example of this is remembered from the huge stocks of sugar stored at Mackay in the early part of 1918. It is unfortunate that in addition to other troubles, grubs have caused considerable damage in the Cairns areas this season. Another depressing feature was that farmers were for the most part only receiving reduced payments for cane to enable them to pay the costs of cutting.

Innisfail.

Innisfail had been experiencing some dry weather, but good rains occurred towards the end of October, at intervals, and the young cane was looking green and healthy. At South Johnstone crushing was proceeding rapidly, 130,000 tons of cane having been put through the rollers up till about the 20th October. Grubs had not been very troublesome.

The commercial cane sugar in the cane at that time was 14½ per cent., the average to date being 12½, the cane put through each week being about 6,400 tons. There has been little growth in the cane since June last, and a great deal of late cut cane is still very backward, so that much of it may not be cut this season.

There have been a large number of cane fires, notwithstanding no permission has been given by the mill to burn. The effect has been to make work slow in the mill, and to give considerable trouble in the manufacture of sugar. All the mills in the Innisfail district have been obliged to erect large storage accommodation for sugar. Goondi mill was doing excellent work and expected to get through its large crop by about the 18th December. The Mourilyan mill had experienced some difficulties in the early part of the crushing, but was now making up for lost time.

The cultivation of bananas is now being again seriously undertaken in the Innisfail district, owing to the advent of the railway rendering same possible. There are now between 400 and 500 acres of bananas in this area. Some of the farms are on the Fisher's Creek tram line and others on the main North Coast line, comprising about fifty growers. Scrub is being rapidly felled for this purpose. The secretary of the Fruit Growers' Association (Mr. Page) is well satisfied with the progress that has been made so far, and it will open up an avenue for settlers unable to grow sugar.

Tully River—The New Mill a "Made in Australia" Triumph.

The fine modern mill on the Tully had just reached completion at the end of October, and is the finest sugar-mill in Australia. It has a normal milling capacity of 50 tons of cane per hour, and will easily be able to treat 7,000 tons of cane per week. The crushing plant consists of a Searby shredder and four huge three-roller mills, each roller being 6 feet by 34 inches. Each mill has an independent drive. Overhead is a travelling electric gantry. There are five large superheaters and four effet pots with a heating surface of 20,000 cubic feet. Four immense vacuum pans deal with the boiling of the syrup—2 coil pans and 2 calandria pans. Beneath these are eight enclosed crystallisers, 7 feet 3 inches in diameter by 26 feet long. Below this stage are the fugals, sixteen in number, all electrically driven.

The boilers are six water-tube type, made in Wolverhampton by Thompson, four being arranged to burn megass which is automatically transferred and fed, while the other two will be coal fired. The chimney is 100 feet in height and contains over 100,000 bricks, every one of which was laid by one man. An electric winch operates the trucks conveying fuel to the boilers. These boilers will provide all the steam for driving the crushing engines, a few small steam engines, and three Bellis-Morcom electric generating sets, which latter supply the power to drive all the motors which operate pumps, elevators, crystallisers, centrifugals, cane rakes, and many other pieces of machinery, and for the electric lighting of the yard and the mill. The approximate floor space of the mill is 70,000 square feet.

A particularly fine view of the powerful crushing plant is obtained from the pan stage. Looking down on this series of rollers so massive and resistless in strength, one is filled with admiration for the engineering ability and constructional skill that has brought it into being. From the crushing station an equally impressive view is obtained of an immense wall of machinery comprising the pans, effets, crystallisers, and fugal stations. At Banyan Creek, which is the source of the mill's water supply, two Kelly and Lewis centrifugal pumps electrically driven have been installed, capable of delivering 300,000 gallons of water per hour. There is also a spray system for cooling condensed water provided, and many other details.

The whole of the machinery, excepting the electrical plant, boilers, and fugals, has been made in Australia, and a feeling of pride is engendered that this should be so. Walker's Foundry have built a great part of the machinery and erected the mill, the Bundaberg Foundry having constructed the effets and juice heaters. The construction of the mill has been in the charge of Messrs. Barbat and Sons, of Ipswich. The engineer for the Bureau of Central Sugar Mills (Mr. Chalmers) has been on the building and plant during erection, and Mr. J. Cran, formerly manager of Babinda and South Johnstone, will be the first manager of the Tully mill. A thriving township is now growing up around the mill, including the first bank to open—the National Bank of Australia. The new mill was to commence crushing on the 5th November, preliminary trials having been made. It is expected that some 18,000 tons of cane will be treated during the remainder of the season, but next year a very large crushing is anticipated.

Mackay.

The district of Mackay was found to be cutting the biggest crop of cane in its long experience. Every mill anticipated exceeding its original estimate. The young cane was looking particularly well. Rain is needed, but the district is not very dry yet. The Hatton district has a fine appearance this year, and the Cattle Creek mill has a good crop and appears to be over the worst of its difficulties.

Bundaberg.

The Bundaberg district has had a long dry spell, and rain is urgently needed. The appearances there last week were promising for rain, and some useful showers fell in different parts of the cane-growing areas.

All the experiment stations have harvested good crops this year, and the work for next season is well in hand. New experiments have been laid down, while the work of seedling propagation at South Johnstone is still advancing.

Summary.

Within the sugar industry itself little or no trouble with labour has been experienced this year, but outside industrial unrest has considerably affected the industry. Large stocks of sugar are held at many of the Northern mills owing to the impossibility of getting the staple loaded during the recent rotary and overseas strikes. It is stated that much of this sugar will not get away till about April or May of next year. This, in addition to the industry having to carry the loss in exporting its surplus, will lead to much uncertainty as to the final price for sugar, which may not be determined till near the commencement of next crushing.

The mills generally are still holding to their earlier estimates, and if these are realised the year will be a record one for production. The district of Mackay alone expects to manufacture 85,000 tons of sugar this season, and many other Northern mills are expecting large yields of sugar. A few of the mills have reduced estimates, but this is compensated for in larger yields at other mills.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations has received the following report (17th November, 1925) from the Acting Entomologists at Meringa, near Cairns, Messrs Burns and Mungomery.

Entomological Exhibit at Innisfail Show.

One of the chief advantages of a show to a district is the bringing together of all classes of the community to enable people to gain a more intimate knowledge of their immediate surroundings and resources, and also to enable them to discuss freely important economic questions, and in these respects shows have been frequently referred to—and very aptly, too—as the "Shop windows of the district."

Some of the economic points often under consideration by the majority of the canegrowers of the Innisfail district were embodied in the exhibit of this Entomological Station at the recent Innisfail Show, held on the 3rd and 4th of October, and this exhibit, which was placed in a very conspicuous part of the hall, was the subject of much interest and discussion, being much appreciated by all who viewed it.

Featured in this exhibit were many showcases depicting the habits and life-cycles of many species of cane beetles, together with various digger wasp parasites, as well as their hyper-parasites; the beetle borer with its controlling parasite, the Tachinid fly; the giant white ant which causes extensive local injury on the Lower Burdekin; and a great many pests of minor importance to sugar-cane.

Various charts were displayed relating to the life history of the "grey-back" cane beetle (*Lepidoderma albohirtum* Waterh.) and its methods of respiration in some of its earlier stages; and with a direct bearing on this latter subject were two charts illustrating diagrammatically the advantages and disadvantages of fumigation during dry and wet weather respectively.

Bottled specimens, in spirits, of cane grubs of various species were also comprised in the exhibit, and much interest was evinced in this topic.

Mr. Mungomery of this Experiment Station was in attendance, and the opportunity was taken by several of the farmers and others interested in the sugar industry of asking questions and discussing with him different problems directly affecting them.

Notes on Bud Moth *(Opogona glycyphaga* Meyr.).

This pest, though one of comparatively minor importance only, has been, and is at present, doing damage to the "eyes" of cane generally throughout Northern canefields. The centres of injury by this insect are invariably confined to the buds and region near them, also to the areas enclosed by and near the leaf sheaths.

Owing to their small size and seclusive habits, the larvæ of this moth are frequently passed by unobserved.

There are several broods during the year, the autumn and summer ones completing their life-cycles in a considerably shorter period than the broods that are produced in the winter and early spring months. On an average the life-cycle occupies about three months, this time being either prolonged or diminished according to the state of the weather. In specimens bred at the Laboratory during the past four or five months, larvæ that were taken on 27th June (then about two-thirds grown) were full grown by the end of July and beginning of August. Some that pupated on 10th August emerged as perfect moths on 25th to 27th August, making the duration of the pupal period, on an average taken from four specimens, twenty days. In specimens bred out during the latter part of September and in October, the pupal period only lasted from fourteen to fifteen days.

The larva of this insect when fully grown measures about ¾ of an inch long (individuals vary slightly), the body is cylindrical and narrow, of a semi-transparent dark straw colour suffused with pale brown or pinkish brown. The head is darker brown and shining; on each body segment from the third one from the head are situated in the lateral areas several minute brownish blotches. Those larvæ when taken from their tunnels or sheltering places are very active, crawling along with a series of rapid, jerky undulations.

The pupa, which is brown and measures about ⅜ of an inch long, is enclosed in a small silken cocoon usually to be found under a dead leaf sheath or folded leaf or else in a crevice. Woven in with the silk on the exterior of the cocoon are numerous small pieces of dead cane and grass, &c., which give the cocoon an appearance so similar to that of its surroundings that it is very difficult to detect.

The moth is a very pretty insect; across the expanded wings it measures about ⅝ of an inch, and is coloured as follows:—The forewings are yellow with a shining purplish brown apical and sub-apical patch, which extends to the hind margin; shoulders at base, dark purplish black. Hindwings narrow, elongate, yellow with fine obscure greyish markings. Both wings are ornamented with long cilia (hairs) fringing their outer margins. The antennæ are yellow, slightly more than two-thirds length of costa, the basal joint is much stouter than the succeeding ones, and is purplish black in colour. Head, pro-thorax and meso-thorax purplish black; meta-thorax and abdomen pale ochreous. Legs yellow, hind pair with their tibiæ covered with dense cilia.

The moths rest by day with the wings folded along the body tent-like, and always have their antennæ projected in front of them in two parallel lines. They are to be found under cane leaves, on stems, or any sheltered situations.

The tunnels made by grubs of the weevil borer (*Rhabdocnemis obscurus* Boisd.) and moth borer (*Phragmatiphila truncata* Walk.) in cane stalks are much resorted to by larvæ of *Opogona;* this affords the latter considerable protection from their parasitic and predatory enemies, and very probably accounts in a considerable measure for the light parasitism of the larvæ of this insect. A small Hymenopterous parasite in the form of a minute Chalcid wasp (*Stomatoceras gracilicorpus* Girault) has been bred in previous years at this Laboratory.

In the selection of "sets" for planting, it is wise to examine these carefully in order to make sure that they are free from larvæ of *Opogona*, for very often when these larvæ are planted with the sets, the buds are eaten underground, so causing "poor strikes."

Immersion of sets before planting them, in a solution of Bordeaux mixture, has been recommended by Mr. E. Jarvis as an efficient control measure. Immersion should be carried over a period of an hour or so to allow thorough penetration of the poison to any young larvæ that may be overlooked. This method of control also greatly minimises the chances of attack by fungus organisms where the tissues of the cane have been damaged by insects or mechanical injury.

"Frenchi" Cane Beetle Grubs Active (*Lepidiota frenchi* Blackb.).

The period of activity of the grubs of this cane beetle and others which have a two-year life-cycle has now commenced, and will continue until late autumn. These grubs may now be found in their second and third stages feeding at cane roots, and are by far the predominant species of grub to be found now that those of the "grey-back" (*Lepidoderma albohirtum* Waterh.) have long since transformed into the pupal and adult stages.

Adult beetles of this species occur each year, but every second year there is a greater emergence, showing a marked periodicity. The beetles usually emerge in November or December, according to the occurrence of the rains. A couple of weeks after emergence the beetles mate and commence ovipositing. The young grubs appear some three or four weeks later, and continue their activities till the onset of winter, when they go deeper into the soil and form a chamber in which to hibernate over the cold weather. With the advent of spring again they come up to the cane roots and recommence feeding; by this time they are in the second and third stages. They continue their destructive work until the next winter, when they again tunnel deeper into the soil, form their pupal cells and undergo the transformation to pupæ. In this stage they remain for a few weeks, emerging as beetles about October. The perfect beetles remain in the pupal cells often for five or six weeks, hardening and awaiting the first soaking rains to enable them to burrow upwards and emerge.

The distribution of this beetle is not so general in canefields as compared with the "grey-back." It seems to occur more sporadically, the same areas seemingly being affected year after year. In this case farmers who are troubled with this pest should note the areas in which it occurs, and fumigate accordingly; otherwise, if whole blocks be treated when only portions of them are affected, much waste of material, labour, and time will ensue.

To ascertain the exact locality of occurrence, digging under a few stools will reveal the presence or absence of these grubs.

Following this the question has often arisen whether the damage which is sometimes attributed to the "grey-back" in March and April may have been caused by *frenchi* grubs operating in the preceding spring and summer.

CANE PESTS AND DISEASES.

Mr. W. Cottrell-Dormer, who is investigating cane diseases and pests, has reported (20th November, 1925) to the Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) as follows:—

In the course of a short visit to the Johnstone River district twenty-one farms were visited. These farms are situated in the Portion Ten Greenmount, Goodi, Sundown, Innisfail Estate, Queensland Estate, Mourilyan, Mundoo, and the Five-mile localities.

Diseases.

Leaf Scald.—This disease does not appear to be doing serious damage of any kind in any of the localities visited, though it was observed to be slightly prevalent in the Goondi, Sundown, Queensland Estate, Innisfail Estate, and Mourilyan localities. The disease is probably to be found at certain times of the year in most of the farms of the Johnstone River district, but at the present time at least, it is rather hard to find anywhere. The worst infections seen were in two blocks of Pompey, one near Goondi and one at Sundown, and it would seem that secondary infection of this disease is a very real and important matter in this and other very susceptible varieties. This point was especially brought forward on a visit to the South Johnstone Experiment Station where the disease was found to have attacked certain first-stage seedlings which had never come into contact with a knife of any kind, and whose closest proximity to other visibly infected plants was sometimes as much as 60 feet; cultivation had been of the usual type with horse implements and hoes.

Insect Pests.

Lepidiota caudata.—Several specimens of this beetle were collected at lights in the township. Caudata is a minor cane grub in the Johnstone River area.

Cheiragra sp.—Many hundreds of a small violet and brown Melolonthid beetle were observed flying about, pitching on, and mating on the leaves of young plant cane near Goondi mill. Many specimens of these beetles were collected and forwarded to the Meringa Laboratory where they were identified as *Cheiragra* sp. To the writer's knowledge, information relative to the correct economic position of these insects in the canefield is lacking.

Beetle Borer (Rhabdocnemis obscurus).—This insect is, if anything, on the increase in the Johnstone River areas and is doing serious injury to crops of Badila, Clark's Seedling, and Pompey. However, the coming season promises to be a very propitious one for the establishing of the Tachinid fly in certain parts of these areas, and more especially Mourilyan. It is understood that advantage is to be taken of this by the Meringa Laboratory.

FIELD REPORTS.

The Northern Field Assistant, Mr. A. P. Gibson, reports (19th November, 1925):—

Progress in the North.

Extraordinary progress was noted in Cairns and its sugar-producing areas. New and more modern buildings have replaced early day ones, and the town has completely outgrown its water supply. The surrounding sugar fields have expanded considerably, resulting in some very important areas appearing on the map, each and all calling for necessary tramway extensions which have been substantially constructed to convenient localities. These have a dual effect—(1) By cutting out derricking and railway transportation charges; and (2) accelerating the supply to the factories, thereby enabling them to treat the newly harvested cane in a fresher condition. This part of the business is important. It is obvious that such extensions required larger mills and more rolling-stock to cope with the ever-increasing tonnage. All available shed space on the wharves has been utilised for sugar, and the lines thereon are occupied by loaded sugar wagons. The mills on the whole have been running smoothly, but to carry on found it necessary to erect spacious and convenient sugar sheds to meet the ever-growing tonnage of sugar. This unexpected and compulsory expense, coupled with extra handling costs and shorter hours, must materially increase the cost of manufacture; and further, should the wet season set in before the stored sugar is removed, unforeseen losses may ensue.

Soils.

The light brown to red soil adjacent to the almost surrounding ranges appears to be the result of countless ages of rock disintegration, the base apparently containing ferric-oxide, which gives rise to the prevailing red and brown tints. Portion of this land has been growing cane almost continuously since 1882. Such continuous cropping, however, must naturally exhaust some of its essential plant food constituents, which may be restored by judicious cultivation and manuring. Some excellent alluvial soil was seen along the flooded plain of the rivers—Barron, Mulgrave, and Russell. The quality and texture of these varies considerably according to deposition at time of inundations. At Greenhills there are some 900 acres of undulating, very friable red volcanic scrub soil, the greater part of which some years ago was under cane; to-day, perhaps a quarter of the whole is under the plough, due to the almost continuous grub destruction. The remainder is now running rampant with lantana and Chinese burr. The leaf deposit from these, if left for any great time, should increase organic matter in which this soil is deficient.

In the great picturesque Babinda Valley, through which the main North Coast railway passes, the soil is mostly grey decomposed granite with several very interesting tongues of volcanic brick red soils, extending into the grey. The granite country, as a rule, yields a sweeter cane than does the red, but the latter produces heavier crops. A successful grower on the red soil informed me that 39 acres of N.G. 15 (ninth ratoon) recently harvested had returned him just over 28 tons per acre.

The Crop.

The crop for the three mills—Hambledon, Mulgrave, and Babinda—has been estimated at about 540,000 tons. All previous weekly records in cane and sugar have been totally eclipsed, and the present average cane quality is very high—probably at its best. Much of the crop yet remains to be treated, and although damage has been performed by grubs, rats, and borers, it is at present thought the aforesaid estimate will be realised. It is expected that Mulgrave will complete its crop this year. Hambledon probably will not. Babinda, most likely, will crush into February. The management is endeavouring to make up lost time as far as possible, and are crushing to 10 p.m. Saturdays, resuming 4 p.m. Sundays, cane supply permitting.

Harvesting.

The crop being excellent, little or no trouble has been experienced. The harvesters on the whole appear to be of a superior class, and it is said are making big cheques. Much cane is being burned previous to harvesting, and it has been in no small degree disappointing to the farmer to have much of this condemned as being totally unfit for manufacture. The unburnt cane being treated, generally speaking, is very trashy, and it seems very apparent there is no attempt being made to free the stem of embracing sheath and leaf. When cane has been loaded upon trucks standing on the permanent way (which is sometimes done) trash is unavoidably scattered over the line. This should be removed at the growers' earliest convenience, thereby obviating a possible cause of fire from ash or sparks from a passing locomotive. The ground cutting in places was considered to be bad, so much so that the owners found it necessary to have same levelled off by hoes.

Cultivation.

This is the area of big farms. Growers are taking full advantage of their opportunities, and so far the cultivation has been done under ideal conditions; but, speaking generally, it is not as perfect as it might be, although there are times when this is hardly possible. Ploughing is performed mostly by disc ploughs drawn by various makes and types of tractors. As a rule, hoeing cane in cleared ground is avoided as much as possible by the timely use of implements. When it has been decided to plough out the exhausted crop, it is recommended to make use of a narrow cut in preference to a wide one, thereby cutting the stubble up finely and permitting same to disintegrate more quickly. After the trash is burned the ground should be freed of decaying rat and grub eaten cane; this may be drawn into lines by a horse rake and subsequently burned. By so doing the breeding grounds of some of our most dreaded pests are destroyed.

Ratooning.

There are many ways of doing this, the best perhaps is to throw away from the stool with a shear plough and burn up the centres. Ratooning, unfortunately, is too often delayed with the following results:—(1) Ash or inorganic matter is lost; (2) the ground becomes so refractory that inferior subsequent intertillage

ensues; or (3) the new root system developed is severed, thereby temporarily retarding crop growth, more especially during a dry time. Then we have volunteering, relieving, and rolling, the latter three having their advantages and disadvantages—the greatest enemy is perhaps fire.

Pests and Diseases.

Rats and grubs have been responsible for much crop destruction and increased harvesting rates. Farmers can assist in keeping the rat under control by systematic poisoning and clean farm surroundings. Beetle and moth borers also bud moths were noticeable, more so on the moister areas. Fortunately for the canegrower, the self-made holes permit the ingress of predaceous foes which help keep them under control. Few beetles were noted on the wing, their emergence probably being delayed until further rains fall. Leaf Scald, Leaf Stripe, and a little Mosaic disease were noted, more so in the Babinda area. Gum was not noticed, other than that already reported at Aloomba. Many brown caterpillars were found eating the cane foliage of plant and ratoons at Babinda. The apparent careless methods of plant selection may be attributed to the spreading of our most dreaded diseases, and the sooner this is realised the better will it be for our great industry.

Planting.

Little planting was in progress at time of my visit. The soil appeared to be in fair tilth, but somewhat dry. In one instance the seed (B. 147) in use had been soaked in water. The drill ploughs are often drawn by tractors and the plants deposited thickly by drop planter, with a soil covering of some 4 inches. No fertilisers were being applied with the plants. This is generally delayed until a later stage. Some well established and well cared for paddocks of new plant cane were noted throughout those districts, and like the ratoons, for interrupted growth wanted rain, more especially those adjacent to Gordonvale. The principal variety grown is N.G. 15 (Badila), and at present there is not a more suitable all-round cane, but we must not remain contented with this, and it is our object to find a better one. D. 1135 and H.Q. 426 (Clark's Seedling) as a rule do well on the poorer classes of soils, the former, being a deeper rooter, does not so readily suffer from the ravages of grub, whilst the latter is considered to be the reverse and most susceptible to gum. Care should be exercised when planting B. 147, as it is known that it is susceptible to disease.

Manuring.

The principal brands used are Meatworks, B3, and Howe's Mixture, at rates varying from three to five hundredweight per acre. This is generally applied by machine to each side of drills (plant or ratoons). Sulphate of ammonia is used as a top dressing, and offal from nearby slaughtering-houses is broadcasted heavily on resting grounds. This from an agricultural point of view is beneficial. A small quantity of mill compo is also used. Manures are being applied with success sufficient to induce the users to carry on with same.

Green manuring does not appear to be carried out to any great extent, but it would materially benefit the majority of soils. Cowpeas and a little corn are used, the latter is too similar to cane and may carry on Mosaic disease. Mosaic was noted in a small patch of corn grown for green manuring purposes.

At Babinda, on the main mill tramline, 40 lb. rails are taking the place of the 28 lb.; the latter are being placed on the Harvey's Creek and Buckland extensions.

It is yet early to definitely state the 1926 crop prospects other than they are promising at present, but generally speaking urgently require rain. Babinda had treated 108,000 tons to 8th November, another 70,000 tons yet estimated to crush. The weekly mill average quality is just about 15 c.c.s. at present.

The report of the Marine Superintendent showed that the sugar on wharves and approaches during the month of October was as follows:—

Hambledon Mill	3,452 tons
Mulgrave Mill	4,374 "
Babinda Mill	4,627 "
Mossman Mill	1,479 "
Goondi Mill	595 "
South Johnstone Mill	402 "
Mourilyan Mill	127 "
Total	15,056 tons

The Central Field Assistant, Mr. E. H. Osborn, reports (17th November, 1925):—

Mackay Area (Carmila).

This comparatively new area looked remarkably well despite the fact that the weather had been too cold and too dry to enable the crops to make their best growth. Most of the cane is grown upon the south side of Carmila Creek and fairly adjacent to it, and the farms upon the western side are connected with the North Coast Railway at Carmila, by about 4 miles of engine-equipped tramway, laid down by the Plane Creek Mill.

A proportion of the land was originally scrub, mostly in pockets alongside the creek. These pockets are carrying very heavy crops of Badila of a very fair density, while upon the other soils M. 1900, Q. 813, H.Q. 426, and Black Innis are the main varieties. Of these, M. 1900 is easily the most popular, its striking qualities, tonnage, and density being good, and it seems to ratoon very well.

As for H.Q. 426 (Clark's Seedling), although in a few places it had ratooned well yet it was very shy in others. Considering how recently cane-growing has been carried out at Carmila, its progress is rapid. For its area it possesses a large number of tractors, and all farmers are interested in discussing any cultivation methods that promise success. Signs of Red Rot were seen in M. 1900, also a few stools of Striped Singapore carrying Downey Mildew.

Borers were noticed in the older Badila upon the creek banks, and the custom rather in vogue here of leaving the first two crops of trash upon the land (to save chipping) is not to be commended, for it certainly favours borer attack. In many low-lying portions mice have also caused loss this season. Heavy beds of trash means excellent breeding places for this pest.

Losses from cane killing weed were reported, especially upon the poorer classes of soil, but only very slight evidence of the weed was seen during my visits. So far the only cure for this seems forking it out thoroughly.

Of the new varieties a find stand of E.K. 28, fifteen months old, was observed on Mr. Wenzel's farm. This has been practically all sold for plants. A number of inquiries were made about Q. 813, and it is evident that more of this will be planted.

Diseases.—The disease that seems to be doing the most damage in the Mackay area is Red Rot, having shown up badly in M. 1900 and to a slighter extent in H.Q. 426, 7R 428 (Pompey), and Black Innis. Q. 813 seems to have offered strong resistance to it so far. It seems to be spreading, and, as long as plant selection and general control measures are neglected, will continue to do so. When cutting plants a slight reddish discoloration may appear in the cut end of the flesh, and if the stalks are split up, it will be noticed traversing one or more internodes. It is variable in width, and broken in places by short narrow white patches, and if the disease is far advanced one or more of the nodes may have a dried or woody appearance. These markings are caused by fungus growth, and any plant showing the slightest discoloration is a distinct source of infection. The plant, unless badly injured, germinates quite well, and the stool looks healthy enough, but the Red Rot fungus will remain about it, and should the stool become weak from any cause and unable to resist the fungus, it will easily succumb.

Red Rot will not cause serious damage while cane is in a healthy and vigorous condition, but it will where the cane has been weakened by root diseases, poor soil conditions (bad drainage, &c.), or prematurely ripened by drought. It enters the cane through the root eyes, and through wounds from either insect attack or cultivation injury. Besides being a cane parasite, the fungus is able to live on undecayed stools. As Red Rot was at its worst where soil aeration was defective, affected growers should drain low-lying portions and lime and plough in green crops. Premature ripening owing to dry conditions should also be checked as much as possible by constant surface tillage. As Q. 813 is a resistant variety, and D. 1135 to a smaller etxent, these canes should be used on the infected field after liming and green crops. If healthy cane is used for plants, the methods described will certainly tend to check this insidious disease.

Proserpine.

Conditions were very dry and rain was badly wanted for the young plant and recently cut ratoons. Some very good young cane was noticed, so much so, that a good thunderstorm or two should ensure another very satisfactory crop for next year. So far the crops had cut well up to if not over the estimate, and some very good c.c.s. results were being obtained.

Among areas visited, Saltwater claimed some attention. This region is situated some 17 miles from the mill and connected by tramline. Mr. Shepherd, the owner

of Montrose, as the particular locality is called, has some 100 acres under plant cane (1924), and a little further on has another 22 acres of young cane. He has a mile of tramline. The land under cane was originally a light scrub, and seems mainly a strong dark loam broken to some extent and rough on the hillsides. Some very heavy Badila, twenty-months old, was being harvested, and had been carrying a very fair c.c.s. for such a heavy crop until a fire handicapped the harvesting operations. Luckily, however, the mill expected to take all the burnt stuff off without too much loss.

Banana Pocket.

This area still progresses. For 1923, 485 tons of cane were harvested; for 1924, 2,400 tons; while nearly 10,000 tons will represent this season's crop, with, say, 14,000 tons for next year. Some heavy Badila was being cut there, the ratoons of which also showed excellent growth. Many very nice patches of young cane were looking remarkably well. Unfortunately, some of the density returns from the very heavy Badila crops were upon the low side, but that must be expected under conditions prevailing.

The Southern Field Assistant, Mr. J. C. Murray, reports (16*th November*, 1925):—

Nambour.

Nambour has grown into a considerable cane-growing area, so much so that the mill is being taxed to its utmost to handle the crop. The existing tonnage would have been heavier were it not for severe frosts. Frosts, combined with bad conditions in the autumn owing to too much rain, so lowered the resistance of the cane as to bring about severe attacks of gumming disease on some farms. The most severely affected varieties are D. 1135 and Badila. Q. 813 is proving a very resistant variety to this disease, and on that account the farmers are strongly recommended to plant this cane.

Cane varieties making a good showing are Q.813, M. 1900 Seedling, H. 227, E.K. 28, Q. 1098, and H.Q. 285. Q. 970 is also making a good showing, especially in the ratoons. There appears to be an inclination on the part of some growers to confuse the variety H. 227 with E.K. 28. The former can readily be distinguished from E.K. 28 by its very close, erect foliage. The leaves of E.K. 28 are more fleshy and have a more lateral inclination from the growing point than H. 227. In the course of a previous visit made by the writer to the Nambour district he advised growers that H. 227 was a variety worth extending on account of its resistance to disease and frosts. Later observations have confirmed that opinion.

Varieties not recommended to be extensively planted in the Nambour district are D. 1135, N.G. 16, N.G. 15 (Badila), Mahona (N.G. 22), B. 208, or Gingila. This recommendation is made after careful observations, and the conclusion reached is that they are susceptible to disease, and it is not to their best interests if the growers plant them. It is to be noted, however, that these remarks apply only to the districts under review.

Farmers are requested to familiarise themselves with the names and appearance of varieties of which there are a great number. At their meetings, growers having new varieties should bring samples and hold discussions. The question of the behaviour of cane varieties and the possibility of improving weight and sugar content by selection is a very important one. While it is true that a variety under ordinary circumstances may run out, it is also true that with very careful selection varieties may be improved. The Sugar Experiment Stations can point the way, but farmers must co-operate. There is now a splendid group of canes distributed on farms which might be known as the Q. group of seedlings—that is, those canes designated by the letter "Q." It is probable that all these canes can be still more improved by selection, or at any rate maintained at their present good standard.

The small black beetle, *Pentodon australis*, is the one pest most frequently seen. The larger and more voracious cane grub is doing very little damage, although the larvæ of the sugar-cane moth is causing considerable damage in blocks of Gingila cane.

Mosaic still requires a good deal of attention. Assistance was given to growers on this occasion in relation to recognition.

Maryborough and Tiaro.

Tonnages are fair, but harvesting is proceeding slowly. The best crops on these areas are to be seen on the Mary River at Blackmount. Varieties generally making a good showing are M. 1900 Seedling, Q. 813, and Q. 1098. These are all good canes, and the growers could extend the planting of these varieties.

Cane diseases are not causing serious loss, although Mosaic is frequently seen. When finally ploughing out stools affected with this malady, care should be taken to see that they are burnt.

Growers should remember that very frequently the cause of cane falling out by the roots or of the stool showing prominently above the ground is due to subsequent cultivation. The drills should be kept open as long as possible when the cane is growing.

COMPARATIVE TRIALS WITH RATOON AND ANNUAL UPLAND COTTON CARRIED OUT BY THE QUEENSLAND DEPARTMENT OF AGRICULTURE IN 1924-25.

By G. EVANS, M.A., C.I.E., Director of Cotton Culture.

The Cotton Industry Act which was introduced by the Queensland Government in 1923 contained clauses prohibiting the ratooning of cotton. All cotton was to be uprooted and destroyed at the end of each season by a certain specified date. This clause brought forth such a storm of protest that the Government found it necessary to modify this section of the Act after the lapse of only a few months. At the same time the Department of Agriculture received instructions to carry out a series of experiments with a view to obtaining absolutely reliable data on the whole question. Ratoon cotton is defined by this Act as—

> "Cotton obtained from the second or any subsequent growth made by cotton plants, whether such plants have borne a crop or have been in any way cut down or burnt or destroyed or eaten by stock: the term includes tree cotton or any perennial cotton."

It was claimed by the "ratoonists" that ratoon cotton was just as good as annual cotton and should therefore receive the same range of guaranteed prices from the Government, and that there was no justification in making any distinction between the two. The spinners and manufacturers were almost equally unanimous in their opinion that the ratoon was inferior to the annual, and although they stated that the former was marketable under normal conditions, it was nevertheless not worth so much as the annual.

The Government policy towards the cotton industry has from the start been to promote the production of cotton of high quality, since it was realised that the high standard of living that obtains in this country, and as a natural corollary the high wages, would tend to make the establishment of a cotton-growing industry of a permanent nature a practical impossibility on any other basis, because otherwise the growers would be brought into direct competition with certain cheap labour countries that are at present producing abundant supplies of cotton of the more inferior qualities.

The Government was further faced with the problem that they had guaranteed the cotton crop over a series of years. Therefore, if ratoon was an inferior cotton and was allowed to receive the same price as the annual cotton, a considerable financial loss might result. Above all, it was felt that the reputation of Australia as a potential producer of good cotton might suffer serious damage. Now that a staff of graders has been trained and a system of basing prices on staple as well as grade has been formulated, this difficulty will to some extent be obviated, since with the introduction of a sliding scale of prices based on quality as a whole the ratoon grower will get a strictly fair price for his product, which will be no more nor less than it is worth.

There are other questions, however, such as the influence of ratooning in the direction of encouraging the spread of insect pests, that have to be considered. This is probably, in reality, the most important factor of all, and it is to be regretted that it is an aspect that has, up to the present perhaps, not received the serious consideration it required. There is no doubt that eventually, and probably before very long, the spread of insect pests will settle the question of ratooning once and for all in this State. It is significant that the Pink Boll Worm (*Platyedra gossypiella*) first appeared in standover cotton fields two years ago in

the Central district, and that from thence it has gradually spread outwards. Those districts on the coast that have gone in for ratooning extensively during the past season have suffered very severely from this pest, and will most likely continue to do so in the future if they persist in this practice. This matter of the connection between the practice of ratooning and the spread of certain other insect pests apart from the Pink Boll Worm, has received the earnest attention of my colleague, Mr. Ballard, the Commonwealth Cotton Entomologist, and it is not therefore my present intention to dilate on this aspect of the case. The trend of evidence seems to indicate, however, that unless a "dead season" of preferably three months is observed during which no cotton shall be in square, the pests will carry over from one season to another, and will become cumulative in their activities earlier and earlier in each succeeding season. In certain of the more inland districts the cold winters will probably render ratooning unprofitable, as most of the plants will be killed outright. But nevertheless, in every district, areas above the frost line occur which will serve as breeding grounds for these pests if the cotton is allowed to stand over. The control of insect pests, therefore, is a community matter and rests in the hands of the growers themslves. It is no use for the majority of the growers to clean up their fields by the prescribed date if one or two neglect to do so, since these neglected farms will serve as centres of infection for the whole neighbourhood.

Finally, there is the economic aspect. The question of relative costs of production, yields per acre, and net profits, are the points that will naturally be most closely regarded by the cotton-grower himself. The financial returns will depend partly on the freedom of damage from pests, as well as on the prices received, and also on the kind of cultivation given, the class of soil, and other factors.

In accordance with the instructions of the Government a series of experiments were designed to try and throw more light on some of the problems that had arisen in connection with the ratoon cotton issue. The truth had very largely been obscured owing to the fact that comparative trials had never been actually carried out in this State, although the results from other countries having somewhat similar climatic conditions to Queensland were in some cases available. It had become the custom to compare samples of annual cotton, often grown under adverse conditions, with ratoon grown under an entirely different set of conditions. Sometimes the varieties were quite distinct, and an annual cotton would be compared with a perennial or tree variety of an entirely different species.

It was felt, therefore, that the tests should be carried out with pure varieties of Upland American cotton, since this is the type commonly grown in this State, and that to make these as reliable as possible, the ratoon and annual cottons should be grown side by side, and on land as even in character as possible, in order to eliminate the climatic factor.

The tests were accordingly planted on land specially selected for its evenness on the three Government Farms available in the Cotton Belt. The soil on each farm represents a considerable area of typical cotton land in its immediate neighbourhood, and the tests extended over two seasons, since the plots to be ratooned had naturally to be planted in the 1923-24 season.

The experiments on the Callide Cotton Reascarch Station were in direct charge of Mr. L. W. Ball, the Manager, who was assisted by Mr. I. G. Hamilton, the Assistant Plant Breeder, in making the necessary detailed observations. The experiments at Monal Demonstration Farm were in charge of the Manager, Mr. S. T. J. Clarke, assisted by Mr. K. V. Henderson, the Experimentalist. At Gatton College, the plots are in charge of Mr. R. R. Anson, and the Department of Agriculture is indebted to Mr. J. K. Murray, the Principal of the Gatton Agricultural College and High School for permission to utilise this land and for affording every facility to conduct these experiments. The work entailed was full of detail, as fortnightly boll counts were made on a number of marked plants in each plot, and the degree of shedding and the incidence of disease noted. Temperature and rainfall records had to be kept and the cultivation books carefully written up. These officers carried out their duties with great care, and the results are therefore reliable so far as they go.

It must be remembered, however, that it is not wise to depend on one season's result only, and also that Queensland comprises several classes of cotton soil that are not represented in these three farms. The results are nevertheless published with the above reservations, as they will undoubtedly prove of interest and may direct attention to future lines of exepriment in this connection.

Experiments at Gatton Agricultural College Farm.

This farm is situated in the middle of the Lockyer Valley about 60 miles from the sea-board, and due west of Brisbane on the main railway line to Toowoomba. Latitude 27½ degrees south, longitude 152¼ degrees east. Between the valley and

the coastal belt is a range of hills known as the Little Liverpool Range which has the effect of shutting out a good deal of the rainfall, so that the total rainfall and the atmospheric humidity is considerably less than on the coast proper.

The land selected for the experiment consisted of a level uniform alluvial flat of great depth along the banks of the Lockyer Creek, consisting of a grey clay loam containing a good deal of silt, and rather heavy and difficult to work. The soil is not quite typical of the best cotton soils in the south-east of Queensland, as lighter and better-drained soils are usually preferred.

The season was not a particularly favourable one in this section of the State. The spring showers came early and caused the ratoon cotton to come away quickly and also allowed the annual to be planted in September. The subsoil was parched after a dry winter, however, and the light showers caused the plants to be shallow-rooted and to be somewhat soft and sappy. December and January were drier than usual, and the ratoon plants in particular shed a very large proportion of their squares and young bolls. Further damage was done by the heat wave in February, and this had the effect of practically finishing the productiveness of the ratoon. Heavy rain in March caused the annual crop to come away again and a fair top-crop was secured from this.

The variety was Acala selected seed, having been imported in 1923 from the Shafter Experiment Station, California.

Ratoon Trials.

Different methods of ratooning were tried and compared with the annual cotton. The plots were all half an acre in size and were laid down side by side on a very uniform strip of soil. The plan was as follows:—

Plot 1.—Ratooned to within 8 inches of ground level.

Plot 2.—Ratooned to the last node at ground level.

Plot 3.—Lightly pruned at the top to remove the ends of the branches which had been touched by the frost in the winter.

Plot 4.—Annual planted on 11th September, 1924, 4½ feet between the rows and thinned out to single plants at 20 inches.

Plot 5.—Same as Plot 1.

Plot 6.—Same as Plot 2.

Plot 7.—Same as Plot 3.

Plot 8.—Same as Plot 4.

At first the ratoon plots looked very healthy and put out numerous suckers with an abundance of squares and bolls, but when the dry spell came the roots were not able to support them and very heavy shedding occurred. The annual plants, on the other hand, made steady progress, and in spite of the vicissitudes of the season, finally ripened off far more bolls per plant than any of the ratoon plots. Boll counts were made on five marked plants in each plot throughout the season, and an examination of the figures thus collected brings out this fact in a most marked manner.

Every endeavour was made to keep the plots clean, and in fact more labour was expended to this end than it would pay the average cotton-grower to employ. In spite of this fact, the ratoon plants spread along the ground to such an extent that it became impossible to hoe in between them properly, and towards the end of the season Bell Vine (*Ipomœa*), nut-grass, and other weeds, got a strong hold and materially affected the yield in consequence. The yields for each half-acre plot were as follows:—

Plot No.	—	Seed Cotton in Lbs. — Yield per ½-Acre Plot.	Seed Cotton in Lbs. — Total of Two Plots.
1	Ratooned to 8 inches	95½	169½
5	Ratooned to 8 inches	74	
2	Ratooned to last node	73	222
6	Ratooned to last node	149	
3	Topped	96	172
7	Topped	76	
4	Annual	301	613
8	Annual	312	

The yields are low owing to the unfavourable season, but the difference between the annual and ratoon is nevertheless striking. The latter, as was the case at the other two farms, proved very difficult and expensive to pick, and did not prove popular with the students at the College in consequence.

Costs of Cultivation.

The costs of cultivation per acre of the various plots are given below:—

Plots 1 and 5 (Ratooned to 8 inches).

	£	s.	d.
Hand pruning, using clippers (49½ men-working hours—at 12s. 6d. per day)	3	17	1½
Eight cultivations at 2s. 6d.	1	0	0
Four hand hoeings at 12s. 6d.	2	10	0
Total	£7	7	1½

Plots 2 and 6 (Ratooned to Ground Level).

	£	s.	d.
Ratooning with cane knives (19¾ men-working hours—at 12s. 6d. per day)	1	10	9
Eight cultivations at 2s. 6d.	1	0	0
Four hand hoeings at 12s. 6d.	2	10	0
Total	£5	0	9

Plots 3 and 7 (Topped).

	£	s.	d.
Hand pruning with clippers (49½ men-working hours—at 12s. 6d. per day)	3	17	1
Eight cultivations at 2s. 6d.	1	0	0
Four hand hoeings at 12s. 6d.	2	10	0
Total	£7	7	1

Plots 4 and 8 (Annual).

	£	s.	d.
One ploughing	0	12	0
Two harrowings at 1s. 6d.	0	3	0
Opening drills and planting	0	6	3
Ten cultivations at 2s. 6d.	1	5	0
Six chippings at 12s. 6d.	3	15	0
Total	6	1	3

It will be observed that the rough and ready method of pruning with a cane knife was nearly as effective and much cheaper than pruning with hand clippers. The growth of Bell Vine rendered it practically impossible to give the two last hand hoeings to the ratoon plots, as after the heavy rain in February, this and other weeds completely took charge of these plots. The annual plots therefore actually received two more hand cultivations and two more horse cultivations than the ratoon plots.

Experiments at the Callide Cotton Research Farm.

This cotton research station is situated on the western side of the Callide Creek, which is one of several dry creeks with only an occasional flow after exceptionally heavy rains, and form what is known as the new settlement area of the Callide Valley. The farm is situated approximately in the centre of this new settlement, and both the soil on the farm area and the climatic conditions can be taken as fairly representative of the whole area. If anything, the particular area in which the farm is located may have a slightly less and more irregular rainfall than in those parts of the valley which are higher up and nearer the hills. The altitude is 530 feet above sea-level, and the latitude is approximately latitude 24½ degrees south, longitude 151½ east. Although it is only about 60 miles as the crow flies from the sea, yet the main coastal range intervenes, and consequently the humidity readings even during the wet season are comparatively low, and the rainfall probably averages about 28 inches.

The season 1924-25 was not an ideal one for cotton-growing, and the total precipitation during the growing season (October to March) totalled 18.32 inches. The spring rains were good and occurred at frequent intervals almost up to the middle of December. The young plants consequently put on a lot of wood and were somewhat sappy. In the case of the annual plants, only a shallow root system was developed. Even in January only light, although frequent, showers were experienced, and were not sufficient to wet the subsoil, which remained very dry. February saw the occurrence of a prolonged and very intense heat wave, which lasted in this part for nearly three weeks. The plants were in no condition to meet this calamity, and consequently practically the whole of the top crop of squares and a number of the smaller bolls were shed. Fortunately, the bulk of the crop had formed by the time the heat wave arrived, but a good number of bolls ripened prematurely and formed light cotton, and the absence of good rains after the heat wave terminated precluded the chance of a satisfactory top crop accruing.

The land reserved for the comparative trials of ratoon and annual cotton consisted of a grey clay loam of alluvial origin, very level in nature, and typical of a large area on the Callide. It was rather more than two acres in area, and was laid out into four plots of half an acre each. The variety was Durango and the seed was the purest in Queensland. The four plots were planted with cotton in October, 1923.

Details of Cultivation—Annual Plots.

Plots Nos. 2 and 4 were kept for ratoon and 1 and 3 for annual.

In Plot 1 the old stalks were cut out by the disc plough and burnt at the end of June, but the land was not properly ploughed until 14th August.

In Plot 3 the plants were disked out and burnt in May and then harrowed. The land was again disked and harrowed before seeding.

The after cultivation of both annual plots was as follows:—

6th October.—Harrowed and planted in rows 4 feet apart.
17th October.—Disc cultivated by the wiggletail cultivator.
24th October.—Disc cultivated by the wiggletail cultivator.
30th October.—Thinned to single plants at 2 feet apart.
10th November.—Disc cultivated by wiggletail.
23rd November.—Disc cultivated by wiggletail.
5th December.—Disc cultivated and "burned off."
22nd December.—Disc cultivated and "burned off."
19th January.—One-horse time scuffler.
30th January.—Crop "laid by."
25th March.—First picking.
20th May.—Second picking.

Ratoon plots had been planted 4 feet between rows and thinned to 2 feet in the row.

In Plot 2. The crop was hilled to 6 inches in the early part of the winter to protect the plants from any frost that might occur.

In Plot 4 the old stalks were left standing, whereas in the ratoon they were cut down to ground level. Most of the old stalks were killed to ground level by frost.

The after cultivation in both plots was as follows:—

18th August.—Ratooned level with the ground, the bushes raked off and burnt, and the land cross-harrowed.
28th August.—Cultivated with one-horse scuffler.
4th September.—Hoed between the rows.
5th September.—Cultivated with one-horse scuffler.
2nd October.—Cultivated with wiggletail.
31st October.—Cultivated with wiggletail.
10th November.—Cultivated with wiggletail.
5th December.—Hilled slightly and laid by.
16th February.—First picking.
1st May.—Second picking.

The yields per acre were as follows:—

	Lb. seed cotton.
Plot 1.—Annual	947
Plot 2.—Ratoon	610
Plot 3.—Annual fallowed	1,215
Plot 4.—Standover	540

Difficulty in Cultivating Ratoon Cotton.

The suckers from the ratooned cotton bushes spread out in all directions from the old root stumps and early in the season lay along the ground so much that horse cultivation had to be discontinued and hand hoeing, which is very costly in this country, had to be substituted. This land had only been under cultivation for two years and was consequently comparatively free of weed and was much easier to deal with than would have been the case with land that had been longer under cultivation.

The manager was successful in this case in keeping the crop nearly as free from weeds as in the annual plant alongside, but he undoubtedly took more trouble to accomplish this than an ordinary farmer could afford to do, because it was realised that unless the weeds were kept down both the yield per acre and the quality of the fibre produced would suffer, and it had been decided to grow the ratoon cotton under as favourable conditions as possible.

The Cost of Picking.

This item is one of the problems that faces the Queensland cotton farmer at present. The cost of picking all over the State last year averaged 2d. a lb. of seed cotton. Anything, therefore, that tends to aggravate this difficulty has to be avoided. In the ratoon cotton, owing to the spreading habit of the fruiting branches, a large proportion of the ripe bolls are found to be lying on the ground at picking time. This fact incidentally accounts for the fact that a considerable percentage of the ratoon cotton that is produced in Quensland is of a low grade. The bolls are also smaller and weigh lighter than the plant cotton, and these factors render picking expensive. As a matter of fact, the contract pickers who were engaged for the season by the farm manager refused to pick the ratoon plots after two or three days' trial. Their average tally on the ratoon was only 40 lb. for an eight-hour day, whereas on the annual they were averaging 84 lb. The result was that men on daily wages had to be employed to pick the ratoon and the picking costs worked out at 4d. a lb., or twice as much as for the annual.

The Effect of Frost.

Although one plot was hilled up well during the winter months, yet a considerable proportion was killed. About 40 per cent. of the old plants sprouted early in the season and another 10 per cent. came away later. The season was a comparatively mild one, and a higher proportion would probably die in other years.

Estimated Costs of Production and Profits per Acre.

The average of the two ratoon blocks comes to 575 and of the two annual plots at 1,081 lb. per acre. The following estimates are based on the farm records for the past season:—

COSTS OF PRODUCTION.

Ratoon Cotton.

	£	s.	d.
Hilling up old crop	0	2	6
Removing and burning old stalks	0	10	0
Scuffled three times at 2s. 6d.	0	7	6
Disc cultivated three times at 1s. 6d.	0	4	6
Hoed once	0	4	0
Total for bringing crop to harvest	1	8	6
Cost of picking 575 lb. at 2½d. per lb.	5	19	9½
Baling of, bales, carting, &c.	0	6	0
Total	£7	14	6½
Value of 575 lb. at 4d.	£9	11	8
Net profit per acre	£1	17	1½

Annual Cotton.

	£	s.	d.
Ploughing	0	12	0
Harrowing	0	2	0
Planting	0	2	6
Thinning	0	8	0
Six cultivations at 2s.	0	12	0
Total to harvest	1	16	6
Cost of picking 1,081 lb. at 2d.	9	0	2
Baling of, bales, carting, &c.	0	11	0
Total	£11	7	8
Value of 1,081 lb. at 5d.	£22	10	5
Net profit per acre	£11	2	9

This estimate is probably favourable to the ratoon cotton since the picking costs have only been estimated at 2½d., whereas the actual cost on this farm using daily labour was nearer 4d. a lb. Similarly, the ratoon value was placed at 4d. although the Government guaranteed price for the two top grades of ratoon during the year under report was only 3d. The ratoon produced in these blocks was much superior, however, to the average of this class of cotton at present produced in Queensland. Nevertheless, the grade and quality was markedly inferior to that of the annual cotton grown alongside, and it was decidedly shorter in staple and also more irregular in character. Although the prices obtained by these cottons on the

open market are not yet to hand, it is believed that a fair approximation has been arrived at by placing the ratoon at 4d. a lb. and the annual at 5d. for seed cotton.

The Occurrence of Insect Pests.

There have been repeated arguments brought forward in the last three years by those who support ratoon cotton, that it is not so susceptible to insect pests as the annual plant. A trained entomologist was accordingly stationed at the farm for the whole of the growing period and a series of detailed observations were made. His records prove conclusively that not only were all the common pests observed on the ratoon in abundance, but that in the year under report the damage done was at least as great on the annual. Further, it was proved that the ratoon plants provided a favoured breeding ground for pests early in the season, since this cotton was earlier by about six weeks than the annual. As a result, the annual plots adjacent to the ratoon became attacked at an earlier stage than usual, and the pests spread out from the centre of infection to outlying areas. The pink boll worm, for instance, made its appearance first in the ratoon and spread out gradually over the whole farm, the plots nearest the ratoon having the heaviest infection of this and other pests.

Experiments at Monal Demonstration Farm.

This Demonstration Farm is located about 80 or 90 miles due south of the Callide Research Station, from which it is separated by a spur of the Main Range which runs east and west. This farm, however, is rather more elevated, being nearly 700 feet above sea level, experiences more severe frosts in the winter, and, therefore, has a somewhat shorter growing season. On the other hand, being situated nearer to the hills, it possibly possesses a slightly heavier and more dependable rainfall, which may average about 30 inches for a series of years.

The farm consists of about 600 acres situated on the Monal Creek, which is one of several creeks that form the head tributaries of the Burnett River, and comprises an area of alluvial soils along the creek with a portion of the low, rolling hillsides and slopes that form the borders of the valley. The soils are typical of the Upper Burnett New Settlement area in which it occupies a fairly central position.

The season on the whole was favourable for the cotton crop. The spring rains were good and frequent, and resulted in the young plant forming too many lateral roots and not developing a tap root. A somewhat sappy growth therefore resulted. The heat wave, however, was not so prolonged or so severe as at Callide, and although the first picking, especially on the lighter soils, contained many small and prematurely opened bolls, yet, as good soaking rain fell afterwards, the result was a very heavy second crop. An early frost on 22nd April stopped any chance of securing a record crop, but, nevertheless, excellent returns were harvested, and the average for plant cotton over 16 acres was over 1,550 lb., the portion planted in late September actually giving 2,200 lb. of seed cotton to the acre.

As at Callide, the variety grown was Durango. The land selected for the experiment consisted of a strip of alluvial soil along the creek frontage. In this locality the soil actually on the creek lies higher than a hundred yards or so further back, and consists of a light sandy loam gradually changing to a chocolate, and finally to a dark-grey clay loam the further one gets away from the creek. The plots were laid out in long strips to include all these classes of soil and were as level as possible in appearance.

Description of the Experiment.

The ratooned block consisted of an acre which was planted in the second week of November, 1923, and from which a good crop was harvested in 1924. The rows were 4 feet 6 inches apart and a good strike was obtained, plants being thinned out to 18 inches apart. The plot was ratooned to within a few inches of ground level in September, 1924.

Although the 1924 winter was a comparatively mild one for this part of the Burnett, yet a great many plants were killed out and a stand of only 30 to 40 per cent. was left over in the spring. The gaps were, however, filled in to some extent by self-sown plants or "volunteers."

The next plot of 2 acres was half planted on 5th January and half on 5th March, 1924. The object of this was to test out a theory that had been expounded by certain persons that the best way to grow cotton is to plant in the autumn months when good rainfall generally occurs and a good strike can thus be assured. In this experiment the March plant was entirely killed out, not a single plant surviving the early frost of 22nd April which registered about 7 degrees of frost. The January plant was slightly better, as the plants were older and tougher when the

frost occurred. An actual count of the plants surviving was made on 13th December, 1924. The total number of plants still alive on the whole acre was 88, and of this 79 occurred on the top quarter of an acre near the creek where the soil was a light sandy loam and was slightly more elevated, so that the frost was not quite so intense. After the count, the plot was ploughed out and prepared for maize.

The actual experiment resolved itself, therefore, into a relative test of one acre of ratoon cotton and one acre of plant cotton alongside. The yield per acre from the annual plant was 1,693 and from the ratoon 430 lb.

The following tables give the dates of each cultural operation and the costs thereof of the ratooned as annual experiment. The cultivation given and the approximate costs of production are given below:—

PLANT COTTON BLOCK.

Date.	Operation.	£	s.	d.
1924.				
1st Sept.	—Ploughed to 6 in.	0	12	0
10th Sept.	—Harrowed	0	2	0
23rd Sept.	—Cultivated	0	2	0
31st Sept.	—Planted 15 lb. seed per acre in rows 4 ft. 6 in. apart	0	2	6
5th Nov.	—Thinned out to single plants at 20 in. apart	0	8	0
14th Nov.	—Cultivated	0	2	0
8th Dec.	—Hand hoed	0	4	0
23rd Dec.	—Cultivated and laid by	0	2	0
1925.				
15th Mar.	—Picking commenced.			
		1	14	6
Cost of picking 1,693 lb. at 2d. per lb.		14	2	2
Total		15	16	8
Value of 1,693 lb. at 5d. per lb.		35	5	5
Net profit		£19	8	9

RATOON COTTON BLOCK.

Date.	Operation.	£	s.	d.
1924.				
8th Sept.	—Old stalks cut down to 3 in. of ground level, removed and burnt	0	10	0
11th Sept.	—Disc cultivated	0	2	0
19th Sept.	—Spring tooth cultivated	0	2	0
1st Oct.	—Hand hoed	0	4	0
6th Nov.	—Hand hoed	0	4	0
1925.				
16th Feb.	—First picking.			
		1	2	0
Cost of picking 430 lb. at 2½d. per lb.		4	9	7
Total		5	7	7
Value of 430 lb. at 4d. per lb.		7	3	4
Net profit		£1	15	9

It will be noted that but two hand hoeings were given to the ratoon section. It was found impracticable to destroy all of the weed growth in the row spaces, so that the hoeings consisted mainly of destroying any large weeds which were close enough to the cotton plants to endanger the cotton becoming entangled with the seeds thereof.

As was pointed out, the land was in a deplorable condition after the removal of the ratoon crop, and heavy expense will be incurred in getting the plot cleaned up free from weed growth during the next few seasons.

Conclusions.

The results for the 1924-25 season are perfectly conclusive so far as these forest alluvial soils the concerned. The annual plots in each case gave very much bigger yields and greater profits than the ratoon. It is a pity that lack of staff, and other considerations, did not permit of a repetition of these experiments on other classes of soil, and particularly on some of the "scrub" areas.

The method of ratooning indicates that no better yields are to be anticipated from standover cotton than from bushes that have been ratooned to ground level

or to about 8 inches. From the point of view of the insect pest menace, the latter two methods are certainly preferable.

The chief difficulty with ratoon cotton is that it tends to put out a number of suckers early in the spring and that these spread out horizontally and hinder the use of cultivation by horse implements. Unless, therefore, the hand hoe is used (and this can only be done in small areas because of the great expense entailed) the weeds get the better of the cotton, and the soil moisture is rapidly used up. Any dry spell that occurs in November and December, therefore, results in the ratoon plant shedding its squares grown and bolls very heavily at this stage. This point was shown up very clearly by the boll counts taken. In order to try and obviate this difficulty an interesting experiment was conducted at Monal Farm. In the second week of December, two rows or ratoon cotton, each 10 chains long, were treated so that the suckers on each ratoon plant were cut away, only one strong sucker being left to each plant. At this stage the plant had produced all its suckers and was full of newly-formed squares. It took three men working with brush hooks half an hour to complete this work, or thirteen and a-half hours for one man to do an acre. With wages at 13s. 6d. a day, this would add 22s. 6d. to the cost of cultivation. The experiment was repeated on a small scale at Gatton. In each case the plants so pruned grew more normally and the remaining sucker grew more upright and produced bigger bolls and cotton of better quality than the ordinary ratooned bushes, but the actual yield per bush appeared to be less. Lack of staff did not permit this experiment to be carried out to a final stage, but the results so far as they went were interesting.

So far as pests were concerned, the ratoon plots certainly showed no superiority over the annual, and, in fact, in the Gatton plots the reverse was very distinctly the case. It was definitely proved at all three centres that the ratoon plots acted as a breeding ground for all the principal pests early in the season.

The difficulty of picking was much greater in the ratoon than in the annual, and this was to be expected, having in view the low spreading nature of the ratoon plants and the number of bolls that lie near the ground.

As regards the quality, it was the definite opinion of the experts on the cotton staff of the department that the ratoon was inferior in drag and lustre, and was also somewhat shorter in staple, and the fibres showed more irregularity in length. The grades were definitely inferior, and this was only to be expected, since the ratoon is earlier than the annual and suffered more from rain when the first bolls were ripe, and also since many of the bolls are so close to the ground, they naturally pick up dirt. A preliminary examination in the laboratory was made and the details are given below:—

RATOON AND ANNUAL COTTON FOR SPINNING TESTS AT THE SHIRLEY INSTITUTE, MANCHESTER.

Brand.	Origin.	Class of Cotton.	Weight of 100 Seed Cotton.	Weight of 100 Seeds.	Weight of Lint from 100 Seeds.	Lint Index.	Ginning per cent.	Number of Bolls per lb.
3A ..	Monal Creek Demonstration Farm	Durango Annual	21·44	13·52	7·92	7·92	36·94	65·9
3B ..	Monal Creek Demonstration Farm	Durango Ratoon	20·62	13·14	7·48	7·48	31·4	71·2
2A ..	Melton Research Station, Callide	Durango Annual	20·72	13·6	7·12	7·12	34·3	78
2B ..	Melton Research Station, Callide	Durango Ratoon	17·74	12·43	5·31	5·31	30·1	98·2
1A ..	Gatton College	Acala Annual	17	10·98	6·02	6·02	35·4	86
1B ..	Gatton College	Acala Ratoon, pruned to 8 in.	13·94	9·14	4·8	4·8	34·4	77·4
1C ..	Gatton College	Acala Ratooned to last node	13·32	9·24	4·08	4·08	30·6	92·7
1D ..	Gatton College	Acala Ratooned cow pruned	13·12	8·88	4·06	4·06	32·3	86·5

N.B.—Weights are recorded in grammes.

In order to settle this question of quality, large samples from all these plots have been sent to the Director of the British Cotton Industry Research Association's Laboratories, at the Shirley Institute, Manchester, who has most generously promised to co-operate in this matter. The cottons from the various plots will be subjected to an exhaustive series of technicological tests and to a spinning test, and the results will be published in due course.

COTTON THINNING AND SPACING EXPERIMENTS FOR THE SEASON 1924-25.

By W. G. WELLS, Cotton Specialist.

The problem of the proper distance to space the plants and the rows in the cotton crop in Queensland is of a very complex nature, and it is questionable if a really satisfactory solution may be obtained. The soil and climatic conditions are so variable that it appears nearly impossible to arrive at any distances which will give the maximum yields for each season over a series of years.

There seem to be certain fundamental facts, however, which enter into the growing of cotton in nearly all parts of the State, and these must influence the problem of spacing and thinning to a marked degree. The weather records for nearly all sections of the cotton belt show that, as a rule, the rainfall is somewhat erratic during the late winter and the spring months. This necessitates a system of cultivation being employed in which the land is ploughed in the fall as soon as the cotton crop is removed and the soil left in a loose condition to allow full advantage being taken of any rains which may occur. This enables a grower to obtain a good strike on a light fall of rain, as the rootlets soon become established in the moist subsoil, and thus are able to develop even under droughty conditions.

The possibility of these droughts occurring after the planting period must be taken into consideration, as in some seasons they are of a prolonged nature, with a resulting check on the development of the plants, and in some cases cause the complete loss of the crop.

Another factor of great importance is the possibility of excessive amounts of rain being received during the critical period when the fruiting system of the plant is being formed. A reasonable amount of rain falling at this period is of great assistance in developing a well-balanced plant, while excessive rain may cause an over-development of the structure of the plant at the expense of the fruiting system.

It is obvious then that the problem requiring solution is, what system of spacing and thinning offers the most assurance that the plant will be able to withstand the variable seasonal conditions and return a profitable yield over a series of seasons.

With this as the accepted definition of the problem confronting the cotton growers, the Department of Agriculture and Stock has been conducting experiments in thinning and spacing for the past season on the State Stations, and with grower-co-operators in different parts of the cotton belt.

The results obtained have not been altogether satisfactory, as several of the co-operators' plots were not taken care of properly, and, in some cases, attacks from various insects caused such losses as to make the experiment of little value. The experiments on the State Farms were completed, however, and these will be discussed to show the effect of the different spacings and thinnings.

Monal Creek Demonstration Area—Season 1924-25.

Mr. S. T. J. Clarke, Manager. Mr. K. V. Henderson, Investigator.

Row Spacing.	Plant Spacing.			
	6 Inches.	12 Inches.	18 Inches.	24 Inches.
3 feet 6 inches	1,834	2,030	1,344	1,393
4 feet	1,949	1,653	1,758	1,492
4 feet 6 inches	1,783	1,732	1,460	1,256
5 feet	1,711	1,548	1,345	1,223

Mr. Henderson's notes on the growth and general results obtained from this experiment are quoted.

> "The rows spaced at 3 feet 6 inches and 4 feet and plants at 6 inches, were very erect in growth, carrying little or no bottom crops. This was improved slightly, but not very much, in the wider spacing at 5 feet.
>
> "The 12-inch spacing was also deficient in bottom crops. At 18 inches, the spacing at 4 feet and 5 feet was the best, although there was very little difference between them and the 4 feet 6 inches. The 5 feet rows at 24 inches were the best in this section in regard to bottom crop, and would have probably given a higher percentage yield than the majority of crops on the farm, had it not been for a fairly bad insect attack early in the season.
>
> "Comparing the yields, the closer spacings have done the best, but allowance should be made for the rainfall for this season, which has been rather excessive."

The following table shows the rainfall for the season in which the experiment was grown, and also the average over a series of years for the corresponding months, so that it can be seen that the rainfall in the three critical months of the development of the crop—November, December, and January—was above normal and of sufficient intensity to have a marked effect on the development of the plant.

Season.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total.
1924–1925	108	150	191	673	447	592	234	323	27·18 inches
1890–1924 .. .. (Average)	122	149	223	253	398	421	336	314	22·16 inches

Mr. Henderson noted that the bottom crop was lacking on nearly all spacings except the 24-inch distance in the 5 feet rows. This would seem to indicate that the closer spacings caused a rapid spindly growth due to the luxuriant growing conditions of the months of November, December, and January, and the fact that the soils on which the experiment was conducted were of a very fertile nature. Unfortunately, a heavy insect attack was received so that the yield per plant in the wider spacing was seriously affected.

The 6-inch spacing, with one exception, gave the highest yield per acre in all four of the spacings between the rows that were used. This can be explained by the fact that the greater number of plants per acre, while not having as many bolls per plant, would yield the greatest number of bolls per acre. Under conditions where there was abundant soil moisture, the competition between the closely-spaced plants would not affect the size of the bolls to a marked degree, and therefore the yield from the close spacing would be the highest.

Somewhat similar results were obtained in the way of yields on the State Farm at Home Hill under the managership of Mr. Munro. As will be noted, the results obtained were not so uniformly consistent as at Monal Creek.

HOME HILL EXPERIMENT.

—	6 Inches.	12 Inches.	18 Inches.	24 Inches.
3 feet 6 inches	950	784	921	647
4 feet	860	708	501	512
4 feet 6 inches	700	600	581	494
5 feet	653	575	706	749

Unfortunately, the first crop of bolls opened in the wet season and, according to Mr. Munro's notes, was destroyed. The boll rots caused much damage during the wet season and some damage was caused by a slight attack of the "boll worm" in the early growth. Monolepta Rosea was responsible for damage to the foliage during December, so that the non-uniformity of results possibly may be explained under these incidents.

The plants grew in most cases to an average of 6 feet in height and of a luxuriant nature, so that the loss of the lower crop under wet season conditions by boll rots could be expected.

The rainfall for the months from November to April, inclusive, was as follows:—November, nil; December, 1.72 inches; January, 2.30 inches; February, 10.85 inches; March, 2.10 inches; April, 4.08 inches.

One effect of the closer spacing between the rows was to lessen the yield at the third picking, all spacings between the plants in the 3½-feet row spacing with the exception of the 6-inch, having been markedly less than those of the wider row spacings. Not much difference occurred between the plant spacings in the wider spaced rows, so that the explanation may be that of extra light penetrating to the ends of the lower fruiting branches on the plants in the wider spaced rows and thus allowing the maturing of the bolls over more of the outer surface of the plant.

No appreciable differences were obtained at Monal Creek or at Biloela owing to the early frosts in the first place and the effects of the heat wave and early frosts in the latter place, which destroyed the whole of the top crop.

The experiment at the Cotton Research Farm at Biloela, in the Callide Valley, was placed on a piece of new cultivation. Owing to the adverse climatic conditions that existed from January on to the end of the crop, and to a somewhat spotted soil, a marked irregular growth of the plants was developed. In reality, the results obtained from the experiment cannot be considered to be of much value, but they are included in the report as a matter of record.

CALLIDE COTTON RESEARCH FARM.

Manager, L. W. Ball. Observer, I. G. Hamilton.

Yields in lbs. of seed cotton per acre.

—	6 Inches.	12 Inches.	18 Inches.	24 Inches.
3 feet 6 inches	1120·1	1057·9	1306·8	1369
4 feet	1252·4	1034·5	1306·8	1143·5
4 feet 6 inches	1064·8	968	1064·8	1210
5 feet	1045·4	1089	914·8	958·3

It is unfortunate that such a variation in the plot developed, as the conditions under which this crop was grown included a long, dry period during the critical stage of the development of the fruiting system which the experiments at Monal Creek and Home Hill did not receive. This is an occurrence which may happen in any season under such erratic climatic conditions as exist in Queensland, and it is very important that all experiments shall undergo such a test.

The season of 1923-24 at Home Hill more nearly approached this condition, so that the results from the same experiment which was conducted at this station in that season are included.

Home Hill (Manager, Mr. Munro).

The rainfall for the months from January to May in 1924 was as follows:—January, 1.93 inches; February, .05 inches; March, .10 inches; April, 1.09 inches; May, nil.

Yields in lbs. of seed cotton per acre—Season 1923-24.

-	6 Inches.	12 Inches.	18 Inches.	24 Inches.
3 feet 6 inches	199·1	385·82	609·85	696·97
4 feet	359·4	*217·8	544·5	*457·3
4 feet 6 inches	*280·7	755	*561·4	1006·7
5 feet	601·1	766·6	757·9	923·5

* Poor stand—irregular spacing.

These results, while rather low in some cases, show the value of the wider spacing both between the rows and the plants.

This is of great importance, as it verifies the general observations which have been made in the field that the amount of soil moisture which may be expected through the growing season, should, to a great extent, be the determining factor in spacing the plants in the row. Where the average rainfall is low and the growing season is characterised by droughts or heat waves, it appears necessary for the plants to have more soil surface from which to draw moisture and plant food.

If a good season generally is experienced in which rains occur at the critical stage of development of the plant, especially of the fruiting system, the best results may be obtained from closer spacing of the plants in the row. In Queensland this does not follow always, as the incidence of pests and boll rots may make a wider spacing necessary in order to allow sufficient light and air to penetrate to the lower portions of the plant.

The consensus of opinion amongst the farmers is that a spacing of 20 to 24 inches seems to have given the best results over the last three years, especially so in the dry areas and in some of the coastal areas.

The usual occurrence of rains in December and the first part of January makes cultivations between the rows necessary when the plants are of a good height. It has been found that 4½ feet seems to be the minimum width between the rows, since this allows a horse and scuffler to pass down the row without doing appreciable damage to the ends of the branches.

This has been accepted as the standard width in the dryer belts, as the plants seem to withstand the droughts and heat waves better than when the rows are spread 3½ to 4 feet apart.

In some sections of the coastal areas or on rich alluvial creek flats in the inland belt where good rainfalls may be experienced, it may be advantageous to space the rows 5 feet apart in order to avoid the over-lapping of the middles of the rows, and thus allow the light and air to penetrate to the lower parts of the plants.

It can be seen that the problem of spacing the rows and the plants is a very difficult one, and a system which gives the maximum results one season may be unsuitable entirely for the same soil under different climatic conditions. Each grower should experiment carefully to determine the distances which will give the best average yields over a series of years, rather than try to obtain a system which will give the maximum yields each season.

APPLES FOR BREAKFAST.

What is said to be a novel combination of fruit and cereal in the shape of a new breakfast food is soon to be placed on the Nova Scotian market. It is reported that the new food is composed of apples and wheat and was evolved as the result of a visit by a food expert of the Department of Colonisation Development of the Dominion Atlantic Railways to the Annapolis Valley with the object of investigating the manufacture of food products from the Valley resources. A series of experiments, it is said, culminated in the successful blending of apples and wheat in flake form. This is said to be the first time in the history of the cereal industry that such a combination has successfully been made.

The food is in the form of a golden flake resembling closely the better-known corn flake which is now on the market. The flavour of the new flake is that of the apple. The product is well dried and consequently is said to possess good keeping qualities in addition to being palatable and easily digested.

A SYSTEMATIC NOTE ON AN IMPORTED LUCERNE PEST, WITH DESCRIPTION OF TWO NEW ALLIED SPECIES.

By A. A. GIRAULT, B.Sc.

During the past year or so specimens of what appeared to be *Bruchophagus funebris* Howard, a small black hymenopteron of the Eurytomine chalcid-flies were shown to me by several officers of this Department, more especially Mr. Henry Tryon. Recently the writer had an opportunity of making examination of additional specimens, confirming the identity of the insect. The species was originally described from North America and hitherto had not been known to me as occurring in Australia. However, upon making inquiry, I found that its occurrence had already been recorded (Froggatt, 1910, 1919), and the writer takes this opportunity of pointing out its characteristics only and describing several allied native species of the same family.

Bruchophagus funebris Howard.

Aside from the generic characters already recorded in literature, but which I am certain will not hold in the face of the large variation in the genus *Eurytoma*, the species *funebris*, as compared with Australian species of *Eurytoma* and *Bruchophagus* is characterised by the structure of the propodeum, which bears neither a median channel nor a median basin, but is flat on the disk and there punctulate. This punctulate area is distinctly wider than long and occupies nearly the whole dorsal aspect.

The first definite record of Australian habitat is by Froggatt (1919).

Eurytoma larvicola new species.

This species is very similar to the preceding species, *funebris*, but the punctulate area on the propodeum is barely wider than long and does not occupy the whole dorsal aspect; moreover, segment 5 is distinctly longest. Abdomen ovate. Lateral ocelli barely closer to eye than to median. In a revised table of the genus this species runs to *australiensis* Ashmead and is grouped with *funebris*, *inconspicuus*, and the following new species. In this table *Bruchophagus* is included, as I have not been able to keep it distinct from *Eurytoma*. Reared from *Agromyza phaseoli* at Cairns, North Queensland, 1915, A. P. Dodd and received from Mr. E. Jarvis.

Eurytoma striatifacies new species.

Runs to *australiensis* but small, the abdomen distinctly compressed, elevated above at base, 6 only half as long as wide, 5 shorter, distinctly higher than long; propodeum with a punctulate median basin which is triangular and bears a median channel which narrows as it leaves base. Segment 6 half the length of 7. Face below antennæ long-striate. Otherwise as in the above species. Tibiæ black save apex. Reared from a braconid parasitic upon *Cirphis unipuncta*, Cairns, Nth. Qld., 1914, A. P. Dodd. Received from Mr. Edmund Jarvis.

Bruchophagus inconspicuus Girault.

This name is preoccupied by *Eurytoma inconspicua* Gir. and I here propose the new name *bruchophagoides* for it.

References.—Froggatt, W. W., Agric. Gaz. N.S. Wales, 1910, p. 544; 1919, p. 251.

Historical note:—

The Chalcid Lucerne Seed Fly.

The fact of the occurrence of the lucerne seed Chalcis (*Bruchophagus funebris* How.) in Queensland, associated with the plant whence it derives its popular name, was not established by the present writer until a comparatively recent date—1922.

In fact, in September of that year, having in view its probable occurrence here, he sought from, and was courteously accorded by, Mr. F. F. Coleman an opportunity of examining reserved samples of lucerne seed that the latter had previously tested for ascertaining its germinating qualities, &c., with the result that he then discovered chalcis-injured seed, still harbouring dead *Bruchophagus* adults that had emanated from two of these samples—one each from Bundaberg and Gladstone respectively.

It was, however, to be concluded at the time that these occurrences were merely afforded by seed being purveyed by the local seed merchant, and had no necessary reference to the existence, in either of the districts named, of the insects living at large endemic therein.

However, Victoria had recently encountered *Bruchophagus funebris* in lucerne seed on it having been received from the other States of the Commonwealth, and had issued regulations for safeguarding the condition of future consignments of the kind, requiring a certificate of freedom from the presence of the Chalcid Seed Fly to ensure their admission, and had asked Queensland to conform to this provision.

And very shortly after this, evidence was forthcoming of the definite occurrence of Bruchophagus in our lucerne fields, and not in one or more seed stores only.

Thus, on 13th February, 1923, the Local Producers' Association of Greymare, Warwick district, noticed that the seeds of lucerne were being destroyed by its small grubs, entire crops being thus injured; and already on 9th April Stock Inspector J. R. W. Munro reported to us that "the borers had destroyed several crops of lucerne seed," also in the Warwick district.

Further, an inquiry instituted by a local resident, Mr. H. L. Pentecost, resulted in tracing the existence of the "Lucerne Seed Chalcis" through different farms extending for 5 miles from Greymare to Rodgers Creek, whence had emanated the original seed from which the Bruchophagus-infected paddocks of the former area had been derived.

Samples of damaged lucerne seed-pods forwarded were found to exhibit numerous exit holes that had been made by the parasite, and to have had their seeds, in fact, generally eaten out by it, whilst they also yielded the insects themselves.

It is of interest, however, to note that, not only in its case but also in that of the lucerne seed originally found damaged by us in the previous year, another small chalcid of a metallic blue-green colour accompanied the black-coloured Bruchophagus, evidently being one of its parasites.

Having ascertained from the well-known Greymare lucerne growers, Messrs. A. J. W. Wickham and H. L. Pentecost, the former of whom has been growing lucerne seed for the last thirty years, that it was practicable to "burn off" lucerne paddocks without injury to the plants, except when the ground thereof was very dry, this procedure was advocated by us, since it presented the simplest method for in some measure controlling this redoubtable seed-destroyer; whilst examination of lucerne seed prior to its being purchased in order to ascertain that it was free from any that had been bored-into, that should always be regarded with suspicion, was stressed as an important safeguard.

It is of interest to learn that during the present month—October, 1925—the eminent authority on the Chalcididæ, A. A. Girault, has confirmed the correctness of our identification of the Queensland Lucerne Seed Chalcid with Howard's *Bruchophagus funebris.*—HENRY TYRON, Government Entomologist.

QUEENSLAND SHOW DATES, 1926.

Stanthorpe: 3rd to 5th February.
Warwick: 9th to 11th February.
Allora: 17th and 18th February.
Clifton: 24th and 25th February.
Newcastle (N.S.W.): 23rd to 27th Feb.
Killarney: 10th and 11th March.
Milmerran: 31st March.
Sydney Royal: 29th Mar. to 7th April.
Herberton: 5th and 6th April.
Miles: 7th and 8th April.
Pittsworth: 8th April.
Chinchilla: 13th and 14th April.
Kingaroy: 15th and 16th April.
Toowoomba: 20th to 22nd April.
Nanango: 29th and 30th April.
Dalby: 29th and 30th April.
Taroom: 3rd to 5th May.
Oakey: 6th May.
Toogoolawah: 6th and 7th May.
Murgon: 6th and 7th May.
Goombungee: 13th May.
Boonah: 12th and 13th May.
Kilkivan: 12th and 13th May.
Roma: 19th and 20th May.
Wondai: 19th and 20th May.
Ipswich: 19th to 21st May.
Wallumbilla: 25th and 26th May.
Esk: 26th and 27th May.
Maryborough: 25th to 27th May.
Childers: 29th to 31st May and 1st June
Marburg: 2nd and 3rd June.
Bundaberg: 3rd to 5th June.
Gin Gin: 8th to 10th June.
Woombye: 16th and 17th June.
Lowood: 18th and 19th June.
Gatton: 30th June and 1st July.
Kilcoy: 1st and 2nd July.
Laidley: 7th and 8th July.
Biggenden: 1st and 2nd July.
Woodford: 8th and 9th July.
Wellington Point: 10th July.
Maleny: 21st and 22nd July.
Rosewood: 23rd and 24th July.
Royal National: 9th to 14th August.
Crow's Nest: 25th and 26th August.
Coorparoo: 28th August.
Wynnum: 3rd and 4th September.
Zillmere: 11th September.
Rocklea: 25th September.

RECORDS AND DESCRIPTIONS OF AUSTRALIAN OPHIONINAE (ICHNEUMON—FLIES).

A. A. GIRAULT, B.Sc., Virg. Polyt. Inst., Assistant Entomologist.

The following records and descriptions are based upon the joint collections of the Queensland Department of Agriculture and Stock and of the Queensland Museum, and are the result of preliminary studies directed toward the vast system of the Australian Ichneumonidæ, as yet very little known. A species of Pimplinæ is also included herein.

1. *Paniscus productus* Brullé. *Paniscus contrarius* Morley.

The following locality records in Queensland:—

Brisbane, 28th June, 1915 (Tryon and Bridwell); January, 1901, April, 1903 (T. Batcheler); April, 1898 (A. H. Benson). Stannary Hills, March, September, 1909 (Dr. T. L. Bancroft). Deception Bay (Bancroft). Indooroopilly, from larva *Heliothis obsoleta*, E. Jarvis, 18th June, 1912. Mount Gravatt, 11th May, 10th June, 1916 (T. Batcheler). Mundubbera, in cotton, March 1924 (J. H. Simmonds). Guluguba, forest, 24th January, 1924.

The species *contrarius* Morley and *productus* Brullé are certainly the same; the areolet varies considerably, and in the above series I have been unable to draw a line between the two. The nervellus did not vary. In both sexes the stigma may vary to yellow and yet the areolet bear the produced arm very distinctly. This fact, therefore, throws doubt upon the validity of *testaceus* Grav.

The Queensland Museum has specimens from the following localities:—

Brisbane, 20th April, 1915; 17th March, 1913 (H. Hacker). National Park, Q., December, 1921 (Hacker). Mount Tambourine, Q., 2nd April, 1911 (Hacker). Charleville, Q., 12th September, 1925. Georgetown, 22nd November, 1915, and St. Patrick's River, Tasmania, 31st January, 1914 (F. M. Littler).

2. *Paniscus testaceus* Gravenhorst.

Brisbane, 8th September, 1915, and Caloundra, Q., 28th September, 1913 (H. Hacker). The several specimens did not differ from *productus* except in the yellow stigma and somewhat smaller size. It is a doubtful species.

3. *Paniscus gracilis* Morley.

Three females identified by Mr. Hacker and also collected by him at Brisbane, 1st October, 1918, and 23rd May, 1916. It is characterised by its very small size and very small (not elongate) areolet. The latter was subsessile in these specimens. Its colour appears stable. Otherwise as in *productus*.

4. *Henicospilus flavivenae* nov.

Runs in Morley's table to *antennatus* but corneus line is attached to the basal mark, elongate, extending distad around the smaller but not minute distal mark; and to *turneri* but entire venation is flavous. Corneous line nearly attaining radius. Differs from *melanospilus* mainly in colour of venation.

Flavus, antennæ red, nearly as long as body; legs, abdomen brown. Metathorax longitudinally, coarsely rugose. The distal mark of wing is large and inverse triangular to the basal.

A female, Stannary Hills, T. L. Bancroft, September, 1909. The descriptions of New Guinea species have not been available.

5. *Henicospilus trinotatus* Morley.

These following specimens identified as such but Morley does not describe the marks of the wing. In the Department of Agriculture collection a female, Southport, Q., 21st September, 1915 (Perron), and two males, Lawnton, Q., 30th November, 1909 (E. Jarvis). The jaw teeth were equal in all.

The corneous marks of the wing are as in *turneri* but the line by being separated from the apex of the large basal mark for some distance makes three corneous marks. Sometimes one tooth of the jaw is twice the size of the other. Basal vein discontinuous. Discoidal vein slightly angled, the basal arm exceeding the distal. Metathorax rugulose. Costa at base, stigma, thorax, red, orbits only flavous. Venation mostly testaceous. The male is similar. These notes from specimens in Queensland Museum as follows:—

Brisbane, 20th, 24th, November, 1913; 24th December, 1912; 23rd April, 1916 (Hacker). Caloundra, 28th September, 1913 (Hacker). Stradbroke Island, 3rd December, 1912 (Hacker). Selby (15th April, 1918) and Beaconsfield (17th March, 1918), Victoria (F. E. Wilson).

In the female from Stradbroke Island the median basal cell was nonciliated, usually sparsely ciliated; and the basal corneous mark larger, the distal minute. In the Victorian specimens the propodeum was longitudinally rugulose. A female which flew into light at Gympie, 27th October, 1924, pricked me severely with its ovipositor when I caught it in my hand.

6. *Henicospilus trinotatus* Morley var.

In the above specimens a female with jaw teeth equal and the basal arm of discoidal nervure with a distinct sinuation beyond middle. I hesitate to name it. From Ebor, New South Wales, 3rd January, 1914 (A. J. Turner).

7. *Henicospilus ruskini* nov.

Runs to *amplipennis*. Antennæ nigrescent, red, black at base; scape, pedicel fuscous beneath; brown, head except clypeus and labrum pale yellow; abdomen beyond 2 black; mesonotum save distad, nigrescent. Veins, stigma black, latter with costa deep black. Basal corneous mark continued in a line to the minute distal but the line is clear near middle. Metathorax as in *flavivenæ*. Nervellus intercepted far below centre, the external vein parallel for its basal half with the vein cephalad of it. Antennæ somewhat exceeding body. A female, jungle, Montville, 14th to 15th June, 1924.

8. *Henicospilus longinotus* nov.

Male. Runs to *nigrinervis* but all red, head and stigma flavus, antennæ somewhat exceeding the body, the discoidal cell subrectangular below distad. The corneous mark is long-elliptical as in *coarctatus* and distal, its outer end projecting into the ciliation, axis longitudinal. Three dark vittæ indicated on scutum. Basal vein strongly discontinuous. Stannary Hills, Q., September, 1909 (T. L. Bancroft).

9. *Henicospilus coarctatus* Brullé.

A female, Brisbane, 14th March, 1913, H. Hacker (coll. Q.M.). Fits Morley's table. Stigma yellow. Corneous mark distad, elongate, spindle-shaped, distinct. The identification is more or less assumed because we do not know the shape of the corneous mark. The nervellus is nearer to base than to centre.

10. *Henicospilus sinuatus* nov.

Runs to *coarctatus* but deflection of radius doubly curved (sinuous) and thicker; corneous mark basal, triangular, and with a very long line extension quite around distal end of glabrous area. Propodeum foveolate. Nervellus somewhat higher, basal vein continuous (lower part nearer base in other). Antennæ dark. Orbits flavous, face red. The face may be flavous.

Brisbane, April, 23rd May, 1916 (Hacker); also April, May, September, October. St. Patrick's River, Tasmania, 31st January, 1914 (F. M. Littler). Glen Innes, New South Wales, 26th April, 1916 (Q.M.).

11. *Henicospilus turneri* Morley.

The following Queensland Museum records: Brisbane, 6th April, 1911; 30th March, 1913; 5th May, 1914; 23rd October, 1922. Mount Gravatt, 12th January, 1913, all by Hacker.

These were identified by Hacker and I have concurred in the identification after examining the specimens. They fit the table, but the basal corneous mark is rather large, triangular, as in *sinuatus*, the line is distinct and runs to the radius (or nearly) behind the outer mark. Antennæ red. The basal vein is subcontinuous; radial cell not restricted at base. The last three segments and apical half of the one preceding them are black, a characteristic. Trans-carina on metathorax strong, region longitudinally striate distad of it.

12. *Henicospilus melanospilus* Morley *rex* nov.

Two pairs which run to this species in the table, Brisbane, 26th April, 6th November, 1911; 28th April, 1914 (Hacker). These agree with the remarks made under the original description of the species, but the inner corneous mark is yellow

and scarcely half the size of that in *turneri*, the line is longer, narrower, the marks being distinctly more widely separated; the body is smaller, more slender, metanotum cross-rugulose, distal mark *far toward apex* first radial vein. A fifth female similar but metanotum longitudinally striate, stigma yellow, lower branch of basal vein somewhat proximad of the upper.

13. *Henicospilus consobrinus* nov.

As *coarctatus* but the corneous mark is a thin line somewhat curved proximad, propodeum with the transcarina and irregular rugæ very coarse (fine in other). General colour brown, head yellow, abdomen, antenna red. Antennæ a bit exceeding the body. Venation brown; discoidal nervure not forming a subsinuate bow as in other but distal arm straight, angled with the shorter proximal. Jaw teeth somewhat unequal.—Queensland.

14. *Exochilum scaposum* Morley.

The scape may be reddish or yellow. The following specimens agree with Morley's description otherwise (as corrected by Turner), but the flagellum is red, the metanotum bears a median sulcus, the submarginal nerve is interrupted somewhat below centre but sometimes at the centre. The male is similar. The red of the legs may vary to flavous and legs 1-2 may be all flavous. The scutum is impressed caudad at meson and there finely cross-lined. In one male from Murarrie the nervellus was intercepted far above centre. The following departmental records:—

Corinda, August, 1900, S. B. J. Skertchley. Deception Bay, T. L. Bancroft, parasite of *Heliothis obsoleta*. Murarrie, 26th September, 1908. Roma, associated with gall on narrow-leafed ironbark, 14th February, 1915 (H. Tryon). Brisbane, November, T. Batcheler. Mount Gravatt, June, T. Batcheler.

The Queensland Museum has a series collected at Brisbane, September, November, December, 1911; October, 1913; 26th February, 1916 (Coolangatta); 2nd April, 1917; March, December, 1918. Also Tambourine Mountain, 28th December, all by Hacker.

15. *Pristomerus bicinctus* nov.

Larger than *atriceps*. Wings nearly black. As *atriceps* but abdomen black except venter and sides of 1 at apex and all of 2; venters of 3-6 save a large, round black spot ventro-laterad, at base of each; apices of 3-5 (save at meson above of 5), these white, the 3 cincti running half way down sides. Leg 3 save coxa above at apex, also black, the other legs more or less infuscated. Areola half longer than wide, 5-sided, truncate at apex, subacute at base; petiolar and adjacent areæ laterad, cross-rugose, the petiolar area long-rectangular. Facial orbits and vertex behind ocelli, red. Scutellum with sparse pin-punctures. Basal area subtriangular, sides converging but not meeting at apex. Femur 3 at lateral apex more or less pale. Large tooth femur 3 at middle, followed to apex by 13 minute teeth. Apices segments 6-7 may be narrowly white. Mesopleurum glabrous widely in disk.

Male similar but frons narrower. Stradbroke Island, several of each sex, 2nd October, 1911 (Hacker).

16. *Ophion partithorax* nov.

Runs in Morley's (1912) table to *inutilis* Smith, but antennæ dark red, metapleurum normal, the other colouration as in *Exochilum scaposum*, which this species resembles. It is distinctly larger, however. Hind metatarsus black save apex, scutellum and postscutellum reddish-yellow. Scape and first (ring-like) flagellar joint all yellow, also the cheeks (continuously with the orbits and face). Last 3 abdominal segments, with claspers (but excluding base ventrad of the first segment) black. Tegulæ yellow. Scutellum sparsely punctate, with a median depression. Propodeum with a wide median cross-rugate groove, also a similar dorso-lateral one, the spiracle oval.

A long sulcus, followed by a hairy ridge, from near base wing 2 to coxa 2. Ocelli not large. Segment 2 above black. Antennæ somewhat shorter than body. Second recurrent nervure from apex first cubital cell, nearly continuous with submarginal whose lower branch is very short. Ramellus absent. Nervellus intercepted at middle. Stigma subflavous. Mesopleurum reddish just beneath tegula.

A male. Stannary Hills, T. L. Bancroft, September, 1909.

17. *Mesochorus australicus* nov.

In Morley's (1913) table of Indian species runs to *claristigmaticus* but differs notably in the wholly jet head and thorax and longer terebra (latter about twice the second segment).

Head, thorax, antennæ, ovipositor, coxa 3 except beneath, abdomen 1 at proximal half (more or less), jet; abdomen, legs brown, darker on segment 2 above and tarsus 3; jaws, scape and pedicel beneath, tegula, coxæ and trochanters 1-2, flavous; venation brown, stigma flavescent, often with a hyaline spot at base. Head, thorax punctulate, head more finely, both pilose. Scutellum convex. Basal area small, quadrate, areola and petiolar area continuous, at first triangular (to apex of external area), then rectangular to middle where for about proximal ½ of rest, the costulæ diverge and then converge to apex; on either side, a large, semicircular external area and caudad of that, an elongate, triangular dentiparal-postero-intermedial area with its base against the external area, apex at widest divergence of petiolar area.

Abdomen finely coriaceus, pilose distad of 2, 1 petiolate, somewhat exceeding 2, 3 somewhat longer than wide; propleurum cross-striate centrally.

A female, window, Brisbane, May, 1896; and 3 others (types) reared from dried apples infested with apparent larvæ of *Plodia interpunctella*, April, 1897, Brisbane. Both by H. Tryon.

18. *Charops pulchripes* nov.

Black, wings clear, stigma black; legs 1 save base of coxa and tarsal 5, 2 save coxæ and tarsals 4-5, tegulæ save at base, radix, base and apex narrowly of femur 3, base more widely tibia 3, flavous; abdomen beneath yellowish. Palpi pale. Jaws yellow. Segment 2 with a dark red spot laterad near apex, 3 and 4 each with another nearer middle.

Lateral ocelli closer to eye than to median. First joint flagellum over twice longer than wide; antennæ slenderer distad; median carinæ of metathorax diverged at base, converging and again gradually diverging nearly to apex; an oblique dorso-lateral carina runs toward each distad. Mesopleurum cross-rugulose. Axis of spiracle oblique. Ovipositor distinctly shorter than 3 (first segment counted here as 2); segment 4 not quite half of 3. Second discoidal cell subquadrate and larger. Basal nervure subcontinuous. Closely pilose, metathorax without long hairs. Scutellum with a distinct wide discal impression, base to apex, the lateral margins ridged. Tarsal 1 in leg 3 nearly twice tarsal 2. Otherwise as *obscurus*. Hind tibial spurs flavous.

Two females, each reared from a tough, oval, grey cocoon with black poles and an encircling band of black spots toward each end; the cocoons are pediceled. On cotton, Queensland, F. G. Holdaway.

A third female from orange foliage, Montville, June, 1924. It was reared from a similar cocoon and lacked the red spots on lateral abdomen.

19. *Polysphincta glabrinotum* nov. (Pimplinæ).

Flavus; dorsad (except head), leg 3 embrowned, the deep, complete notauli and the propodeum distad, concolorous. Stigma, terebra, apex tibia 3 rather widely, ocellar area and a dot on each side meson apex propodeum jet. Antennæ dark, scape beneath flavus, flagellar 1 flavescent, twice the scape, elongate, much exceeding 2; last 5 or 6 flagellars flavescent, ultimate longer than penultimate. Wings subhyaline.

Clypeus entire cephalad, convex. Scutellum flavus, small, convex. Metathorax with a pair of separated median carinæ and from near each, about its middle caudo-distad, a ridge-like elevation; apically these carinæ become acute and move toward coxa 3. Spiracle minute, round, lateral in aspect.

Segments except first and last, with a mound-like "tubercle" on each side meson, with wide, shallow cross-impressions behind each; punctate except hind margins, ultimate segment mostly and penultimate distad; hind margins more or less carinate, 1 with an oblique median sulcus, 2 quadrate, longer than 1, spiracles of latter before centre. Ovipositor about half abdomen. Cephalic tibial spur single, normal. A female, Yeronga, 3rd June, 1924. Forest.

SPINNING TESTS OF QUEENSLAND COTTON.

In the season 1923-24 arrangements were made at the request of the Government to carry out field tests between ratoon and annual cotton with a view to having proper comparisons made, and, if possible, for the arrangement of spinning tests.

It was asserted by the Government from the first that the real test as to the respective values of ratoon and annual cotton could only be ascertained after the cotton had been put through a spinning mill and worked up into the manufactured article. It was accordingly arranged to carry out definite trials on the Government farms with pure varieties of cotton on plots grown side by side under exactly equal conditions. It has naturally taken two years to get these results, because the first year's cotton had to wait over until the second year before it could be ratooned. These experiments have therefore been conducted in the past season and the cotton from each of the respective plots has been sent over to England for technical examination and spinning tests at the Shirley Institute, Manchester, which is probably the best equipped technical institute for work on cotton anywhere in the world. The results should be available in a few months time.

In the meantime, from the 1923-24 crop arrangements had been made with certain private growers who were interested in the problem to grow annual and ratoon cotton side by side, the seed being the ordinary Queensland Upland. Samples from three of these tests were sent over for valuation, and in each case the annual cotton was valued at from 1d. to 1½d. more in value than the ratoon. But it was felt that it would be necessary, in order to confirm these values, to arrange for a proper spinning test, and it was found possible to gin separately the cotton from one of these tests at the ginnery and to make up the crop into two bales, one of which was ratoon and the other annual. The test was carried out in the Stockyard Creek on land which was as nearly alluvial as it was possible to obtain, and the crops from which the bales were obtained were only separated from each other by a narrow road. The ratoon cotton had been cut down to the last node and a very good strike had been obtained. The owner, who is a good farmer, had taken the greatest care to keep the plot clean and properly cultivated. The test, therefore, was as fair a one as it was possible to arrange for outside a properly equipped experimental station.

The two bales were numbered No. 5041 annual and No. 5045 ratoon and were forwarded by the British Australian Cotton Association to Liverpool in the ordinary way, the agents at that end having been requested to place these two bales on one side, and they arranged with the British Cotton Growing Association for a spinning test to be carried out. A report has now been received from the British Cotton Growing Association that the results of these commercial tests, which were carried out at a certain mill, have now been received, and a copy of their report is as follows:—

29th September, 1925.

The British Cotton Growing Association, Manchester.

Dear Sirs,—We are sending under separate cover samples of cotton sliver and yarn from the Australian cotton which you asked us to test, and find there is a marked difference both in appearance and strength. They were put through exactly the same process, one coming out rough and irregular and the other nice and level in appearance. Below we give you tests:—

No. 1—Spl counts 43.93, 36.37 lb. pull per lea (annual).

No. 2—Spl counts 43.29, 34.50 lb. pull per lea (ratoon).

This report is of interest as it indicates that not only is the yarn produced from the ratoon cotton considerably weaker than that of the annual, but that the yarn itself is rough and irregular in appearance and therefore is not so valuable on this account.

The samples referred to will shortly arrive and will be kept in the office of the Government Cotton Classer of the Department of Agriculture and Stock.

These tests are, of course, only preliminary, and the further tests from the pure lots of ratoon and annual cotton which are now in England will be awaited with interest.

A SOUTH BURNETT SANCTUARY.

The property of Mrs. G. Hives, Sunday Creek, Wondai, has been declared a sanctuary in which it is unlawful to kill any animal or bird.

AGRICULTURE IN QUEENSLAND.*

INSTRUCTORS' REPORTS.

THE SOUTHERN DIVISION.

Mr. A. E. Gibson, Instructor in Agriculture, reports:—Climatic conditions in the course of the period under review were more favourable to the pastoralist than the agriculturist.

Late frosts, followed by excessive rainfall prior to and during the harvesting, were responsible for a considerable amount of damage to both hay and grain crops, and ultimately resulted in "weathering" and damage to the germinating qualities of the grain.

An excessively wet harvest was followed by a period of little rainfall, and the maize crop throughout the Darling Downs and other districts that had reached the tasselling stage between the latter part of January and up to the beginning of March failed for this reason. A considerable reduction on the estimated yield of grain was a consequence. Later maturing crops, on the other hand, in many instances were affected by excessive wet weather, culminating in floods.

A plague of mice has since been responsible for further damage to threshed and unthreshed grain stored in barns and in the field awaiting harvesting. Early sown wheat crops that have appeared above ground as the result of the late showers are in many instances so patchy as to necessitate resowing. This was due to the seed wheat being eaten by mice while lying in the ground prior to germination.

In spite of unfavourable conditions, much useful fieldwork was carried out, resulting in satisfactory supplies both as regards quantity and quality of seed maize and wheat for ultimate disposal to growers. Fodder trial plots were to some extent affected by weather conditions, rust being very prevalent in the winter cereals used in connection with the trials, while some of the plots lodged from excessive wet weather.

Fodder plots arranged for during the latter part of 1923-4 financial year were harvested and gave the following results:—

	T.	C.	Qr.	Lb.
W. BEVERLEY, BUNJURGEN—	Per Acre.			
Florence wheat and tares (harvested 16th July, 1924)	8	12	3	24
Patriot wheat and tares	10	6	1	24
Cape barley and tares	13	8	3	16
Skinless barley and tares	9	16	3	13
Algerian oats and tares	12	0	0	20
Ruakura oats and tares	14	9	2	20
Canary seed and tares	12	0	2	14
Florence wheat and peas	11	5	2	29
Patriot wheat and peas	12	19	1	4
Balance of plots not harvested.				

	T.	C.	Qr.	Lb.
C. B. MOUATT, KILCOY—				
Skinless barley and vetches	11	17	2	0
Cape barley and vetches	14	0	3	16
Patriot wheat and vetches	8	2	0	6
Florence wheat and vetches	7	16	2	7
Skinless barley and peas	16	4	0	12
Cape barley and peas	16	4	0	12
Patriot wheat and peas	11	6	3	14
Florence wheat and peas	11	6	3	14
Rape	17	5	2	24
Purple top swedes	34	11	1	20
Elephant swedes	25	18	2	8
Other plot weights not available.				

* From the Annual Report of the Under Secretary (Mr. E. Graham) to the Minister (Hon. W. Forgan Smith) for presentation to Parliament.

D. E. GREGGERY, MOUNT LAWLESS—	T.	C.	Qr.	Lb.
	Per Acre.			
Canary seed and vetches	10	16	0	8
Ruakura oats and vetches	11	10	1	25
Algerian oats and vetches	12	9	3	14
Skinless oats and vetches		*		
Cape barley oats and vetches	†7	4	0	5
Patriot wheat and vetches	†5	15	0	26
Florence wheat and vetches	†5	0	3	9
Canary seed and peas	5	15	0	26
Rape	12	11	0	20
Purple top swede	32	8	0	24
Elephant swede	34	0	2	14
Silver beet	25	2	1	13
Kale	22	13	3	0

* Too mature. † Rather too mature for fodder weight.

An extension of the winter dairy fodder plots was made early in the present year in the Brisbane Valley and Southern Burnett districts, areas being arranged for at Toogoolawah and Boat Mountain. Conditions being favourable for sowing, the following mixtures of winter cereals and legumes were made on the farm of Mr. J. B. Coleman on 31st March, 1925:—

Florence wheat and peas
Florence wheat and tares
Cape barley and peas
Cape barley and tares
Skinless barley and peas
Skinless barley and tares
Rye and peas
Rye and tares
Algerian oats and peas
Algerian oats and tares
Canary seed and peas
Canary seed and tares.

Owing to the lack of preparations of the plot arranged for at Boat Mountain, the sowing of this area was delayed until 12th May, 1925. Conditions on that date were favourable for rapid germination.

The two areas referred to are centrally situated in good dairying districts, and considerable local interest has been taken in the effort to bring under the notice of dairymen the combination of cereals with legumes calculated to provide a fodder having the nature of a balanced ration.

For the purpose of introducing to the notice of the farmers in the Murgon district a crop of which they have previously had little experience, and at the same time securing supplies of pure seed for distribution to growers of broom fibre, a seed propagation plot of 1 acre was established on the farm of Mr. F. Gustafson, who has an area of volcanic soil a short distance from Murgon township.

The crop was sown in November according to instructions given, and results indicate that climate and soil of this locality in the Southern Burnett is capable of producing fibre of high quality. Heavy rain was responsible for the discolouring of late harvested fibre.

A consignment of "hurl" forwarded to Brisbane realised top price and inquiries were directed to the grower for further supplies. Unfortunately, from the cause mentioned, the later cutting was considerably discoloured and not equal to No. 1 grade. Sufficient (cleaned and graded) seed was obtained from this plot to sow an area of 60 acres, and this is held for disposal in the coming season.

During particularly busy periods the services of all the available officers of this branch were requisitioned for purposes of seed selection of maize from the departmental seed propagation plots established in the Southern Division. This seed has since been cleaned and graded, and is available for distribution in the next season.

Inspections were made and reports submitted on the school farm at Zillmere and Soldiers' Convalescent Farm at Mount Gravatt, for the Department of Public Instruction and Home Secretary's Department respectively.

Inspections were also made and reports supplied on the condition and equipment of the Government Poultry Farms established in connection with the Soldiers' Settlements at Mount Gravatt and Enoggera.

Following on the construction of a dip at Cadarga in connection with the tick-cleansing work carried out in the areas adjacent to the Darling Downs, estimates were submitted by the Public Works Department for the supply and erection of a pumping plant at Cadarga together with a residence for the officer in charge, also a residence for the stock inspector, whom it is proposed to establish at Boondooma. These being considerably in excess of the amount anticipated, the Department asked to be allowed to carry out the work on its own responsibility and was granted the concession.

The supply and installation of the pumping plant and erection of the residence at Cadarga were supervised. This work entailed the survey of the site and the taking of the necessary levels between the source of supply and point of discharge, followed by a complete estimate of cost of the plant and residence and erection thereof, together with the cost of cartage from railhead at Jandowae to Cadarga, a distance of 53 miles by road.

The material arrived at the site on the 30th November, and the completed plant and residence were handed over to the officer in charge on 24th December.

A dwelling on the Soldier Settlement at Burrandowan and afterwards forfeited to the Lands Department was purchased, dismantled, and re-erected on the dip reserve at Boondooma, about 40 miles distant. The whole of the work was carried out at a price considerably under the estimate.

Crops obtained from departmental wheat propagation plots were in the first instance forwarded to Hermitage State Farm, for cleaning and grading, and a total of 18 tons 6 cwt. 3 qr. 26 lb., equivalent to 685 bushels, were treated. Owing to the danger of infestation by weevils, lack of facilities for fumigating, and to the fact that the mice plague was very much in evidence, the whole of the graded grain, the bulk of which has since been disposed of to wheatgrowers, was forwarded to the departmental seed stores. Throughout the recognised wheat belt seed was sold at a flat rate of 9s. per bushel, freight paid to the applicant's nearest railway station. This seed has been distributed over a wide area and has given universal satisfaction.

The past season was so favourable to pastoralists that the question of fodder conservation was not a particularly live one, but at the same time a considerable amount of correspondence pertaining to silage and fodder was dealt with. In addition visits were made to country centres for the purpose of giving information on this subject.

Instruction.

In addition to instructional visits to different districts, I have to report that great activity has been shown by the large number of new and established settlers who have consulted this office in respect to a great variety of subjects, in connection with which much correspondence was also entailed.

Taking all things into consideration, I am of the opinion that the farming community generally is looking for first-hand advice on its every-day problems, and the appreciative letters which reach this office indicate that the efforts of departmental officers in this direction are being more generally recognised as a factor in elucidating the problems of the man on the land.

Universal fodder conservation by owners of live stock is still a matter of grave importance, and while a percentage of these may, in seasons of plenty, visualise prospective leaner years, which must of necessity be provided for, a greater number, by reason of apathy or indifference, fail to make provision for them.

Brisbane National Exhibition.

Activities in connection with the show necessitated close attention on the part of the instructional staff. A special effort was made to illustrate the extent and value of fieldwork.

The departmental exhibits were of a very high standard, and the information made available to producers should be invaluable in advancing the agricultural industries of the State.

CENTRAL DIVISION.

Mr. G. Brookes, Instructor in Agriculture, reports:—During the greater portion of the year I was absent from the State—one period from June to November on extended leave in the United Kingdom, another from the middle of April to the latter end of June, 1925, when a visit was made to Java in connection with cassava-growing.

Assistant Instructor Clydesdale took over the duties attached to this office when I was in Britain, but had to leave for the Southern district some time prior to my return. A change was made in the field staff, Field Assistant Hamilton exchanging positions with the Northern Field Assistant, Mr. Straughan.

Shortly after Mr. Straughan's arrival he was transferred for two months to the position of acting manager, Warren State Farm.

Climatic Conditions.

The rainfall for the Rockhampton district was somewhat over the average. The total for the year amounted to 43.84 inches—the average for fifty years being 38.01 inches. Although the wet season was a comparatively short one and the following April and May very dry, the rainfall was on the whole fairly well distributed. Some apprehension was felt in regard to the outlook for the winter and spring, but the situation was relieved by widespread, useful rains falling during the middle of June.

The monthly rainfalls for Rockhampton were as follows:—July, 2.20; August, 7.1; September, 1.83; October, 1.84; November, 3.83; December, 7.57; January, 7.62; February, 3.72; March, 2.00; April, .19; May, .89; June, 5.05. Total, 43.84.

A considerable amount of harm was occasioned to growing crops by a visitation of a heat-wave during the first fortnight of February. Maize, sorghum, and particularly the cotton crops, suffered severely.

Winter Fodder Demonstration Plots.

It has been found that one of the best methods of convincing the farmer as to the benefits to be derived from making provision for his herd, by growing fodder crops, is by actual demonstration, more particularly when the work is carried out by a practical farmer, and in his own particular district. Recently a letter was received from a farmer in the Rosedale district, in which he says: "I have planted a few acres of rust-resistant wheat every season since I first grew the experimental plot for your department." Similar reports have come to hand from the Dawson Valley. Another farmer in the Marlborough district who co-operated with the department some years ago states that he was so impressed with the growth made by rape under adverse climatic conditions that he has put in an area from 10 to 20 acres every winter.

Until recently one of the greatest drawbacks to the raising of fodder crops, by the majority of dairymen, was the lack of implements to cultivate the land. The advent of the cotton industry overcame this difficulty. Practically every dairy farmer rushed into the growing of cotton, many unfortunately to the extent of neglecting their herds. Expensive and up-to-date machinery was purchased, quite a large number of tractors coming into the Central district as a result of the boom.

It would appear that a reaction is setting in. Many who gave up dairying are now building up their herds again, and are making inquiries as to the growing of both summer and winter fodders.

Demonstration Plots.

Practical demonstrations in regard to the best fodder to grow for dairying and the most suitable crops for pig-raising purposes were arranged for in all the principal farming districts. The objective was to show the practicability of providing a continuous supply of feed for both dairy stock and pigs, for an extended period, by planting varieties when conditions of soil were suitable that would mature at different times.

In regard to winter fodders the following varieties were chosen for the purpose (area, 2 acres):—

- Wheat (two varieties).
- Cape barley.
- Skinless barley.
- Algerian oats.
- Ruakura oats.
- Grey field peas and Florence wheat.
- Blue field peas and Florence wheat.

The districts selected for the plots are—

- The Caves; grower, F. Ferguson.
- Ambrose; grower, H. E. Wolff.
- Mount Larcom; grower, F. Huntley.
- Rosedale; grower, J. G. Hales.
- Dawson Valley; grower, A. E. Barnard.
- Marlborough; grower, A. Rake.
- Callide Valley; grower, E. Edwards.
- Alton Downs; grower, S. G. Hoare.

On account of the dry weather conditions prevailing during April and May, planting was delayed until the latter end of June, when useful rains of a widespread nature fell over the whole of the Central agricultural areas.

Experimental Tests at Ubobo.

The experimental work carried out in the farm of Mr. A. J. Turner, Ubobo, Boyne Valley, is proving of considerable interest to the farming community. Applications made to the department to extend this work to other districts is receiving attention. Particulars in regard to the results obtained from last season winter fodder and fertiliser trials have already been supplied to head office, and I believe appeared in the "Agricultural Journal." These tests are being continued during the ensuing year.

Demonstration Plots—Pig-Raising Crops.

The varieties were chosen to give a supply of material from June to December and to mature in the order given. Rape, silver beet, yellow Aberdeen turnip, sugar beet, khol-rabi, Swede turnip, cattle cabbage, globe mangold, long red mangold. The farmers co-operating with the department in this work are as follows:—

J. A. A. Ross, Ambrose.
F. E. Sturm, Mount Larcom.
T. Ferguson, The Caves.
S. Larson, Miriam Vale.
H. Young, Dawson Valley.
A. Rake, Marlborough.
T. F. McRae, Callide Valley.

For reasons similar to that mentioned in connection with the fodder crops, planting was delayed until the latter end of June.

Fodder Conservation.

Further effort was made to encourage dairy farmers in the various districts to provide a plentiful supply of feed for their herds during the winter months and dry periods, by supplying seed of heavy yielding succulent varieties of sorghum, and giving practical demonstrations as to the best methods of conserving the resultant material in the form of silage. Demonstrations in connection with such were given in the Mount Larcom, Wowan, Buneru, Rosedale, and Ambrose districts.

The growing of sorghum during the latter end of summer, and allowing the crop to stand over for winter use, is being strongly recommended as being suitable to conditions obtaining in Central Queensland.

The question of silo construction is being gone into with the Dawson Valley farmers, and a big forward movement in this direction is likely to eventuate in the near future.

Sorghum Experiment Plots.

A number of farmers co-operated with the department in the raising of seed of a number of grains and other sorghums, some of which were of recent introduction. The stud plots were located as follows:—

Ambrose (C. King)—Feterita.
Ambrose (A. McDonald)—No. 61.
Gracemere (E. Seierup)—White Dwarf Kaffir.
Archer (Pritchard and Wannop)—White African.
Mount Larcom (J. C. E. Jacobsen)—White Dwarf African.
Mount Larcom (J. Coase)—Early Amber Cane.
Marlborough (A. Skewes)—Red Kaffir.
Rosedale (J. G. Hales)—No. 61.
Marlborough (G. Ambrey)—Kaoliang.
Marlborough (C. Collins)—No. 61.
Dululu (A. S. Narracott)—Feterita.

Most of the above varieties made good growth; sufficient seed to meet the department's requirements was secured. This has not yet been threshed out, consequently yields have not been determined.

Onions.

Previous experiments carried out in the growing of onions were so promising that further trials have been arranged for.

The object of the tests is to ascertain the most suitable varieties for Central Queensland conditions, and also the districts in which they could be most profitably grown. The tests are being conducted in the following localities:—Tanby, Jones Bros.; Ambrose, J. Sinclair; Dawson Valley, A. E. G. Barnard; Callide Valley, J. R. Adsett.

The planting was carried out rather late (June) on account of the dry conditions that prevailed during the previous two months.

Advantage was taken when on extended leave to visit the research and experiment stations in the United Kingdom, including Rothamstead in England, and the plant-breeding and seed-testing stations in Scotland. Much information was secured in regard to the latest methods of conducting agricultural research. A lengthy report was furnished to the department, giving an outline of the work in progress at the respective stations.

Acting under instructions, I proceeded to Java—leaving Brisbane on 17th April—and made investigations in regard to the cassava industry. A full report dealing with this matter was submitted to you. During my stay on the island I visited the various branches of the Agricultural Department and the experiment stations.

Arrangements were made for obtaining a supply of various crops that would be likely to prove suitable to Queensland conditions.

THE NORTHERN DIVISION.

Mr. N. A. R. Pollock, Northern Instructor in Agriculture, reports:—

During the period under review, seasonal conditions, except for part of April and the whole of May, which were very dry, were excellent all over the Northern Division, the rainfall (over average in many parts) being better distributed throughout the year, with no heavy floods in any of the streams. In August an over-average precipitation occurred in the whole of the division, which gave the pasture an excellent start. Favourable rains in the ensuing months provided an abundance throughout the year.

Fat cattle were plentiful much earlier than for many years past, thus allowing the several meatworks to start sooner than usual with a much longer killing season ahead. Cattle prices offered by the meatworks, though slightly better than in the previous year, are still disappointing to pastoralists, more especially in the Etheridge and Gilbert River districts, from which cattle have been railed past Biboohra to Townsville and Brisbane.

In dairying, production on the Atherton Tableland greatly increased, as also in the Mount Molloy and Daintree River districts. Prices paid by the Tableland Co-operative Butter Company for cream based on the commercial butter equivalent were, owing to the necessity of export of the surplus for sale overseas, lower than for many years past. To compensate in a measure for the low net return from export, local prices were kept at as high a level as possible, which was a distinct advantage to those small factories that sold their whole output locally. Under a compulsory pool no supplier to a small or large factory would have an undue advantage over another.

The favourable season coupled with an increased area under crop has resulted in an exceptionally heavy tonnage of sugar-cane. It is indicative of the unique position occupied by cane, as a profitable crop, that no suggestions are made to divert any of the lands now under sugar to other crops. Where an industry such as the sugar industry is so fostered as to become of over-average prosperity it cannot be expected that attention will be given to crops not so favoured; further, when, on account of average prosperity, an award giving a higher rate of wages is made in that industry, it indirectly operates as an award in all other industries of like nature, rendering them less attractive to investment.

If, when an industry is above average prosperity, an amount were collected and awarded to industries under average prosperity, a more equable status would prevail, and crops not now considered in North Queensland would receive some or more of the attention that they merit.

Natural Pasturage.

It is remarked frequently by graziers that the native pasturage is not what it was in the early years of occupation, when despite dry seasons fat cattle in numbers were obtainable in all months of the year. While the pasturage on the Western Downs, mainly of Mitchell and Flinders grasses, has suffered little deterioration except in the disappearance of legumes, that experience is very true unfortunately in other parts, especially on the eastern coastal slopes. It is evident that when stock are more or less depastured closely the more valuable grasses, which are usually the most palatable, are grazed more closely than inferior sorts, thus allowing a greater reproduction of the latter to the serious detriment of the carrying capacity. This is especially noticeable near towns, where the original grasses, such as kangaroo (*Anthistiria ciliata*) have been replaced to a large extent by bunch spear (*Heteropogon contortus*) and awned spear grasses (Aristida and Eriachne spp.) as well as sundry useless if not noxious weeds.

When questioned on the prevalence of native legumes such as species of Rhyncosia, Glycine, Atylosia, &c., many of which are very nutritious and palatable to stock, graziers of early experience admit that growths of this description were once plentiful on areas where they are now non-existent.

Improvement of Native Pasture.

That the native pasture is deteriorating in many localities is beyond doubt, yet no effort is made to improve it or to keep it from further depreciation, the almost universal reason being given that the cost would be too great and that prices realisable for stock will not warrant it.

Much could be done by subdividing holdings into smaller paddocks, which could be alternately rested and seeded with grasses and legumes of value, and kept quite free of stock until these growths had matured and seeded.

Possibly, conditions in leases of Crown lands, providing for improvements to be effected in this direction and allowing a reduction in rental consequent on the yearly storage of prescribed quantities of fodder, might act as an incentive towards the adoption of practices that would induce greater production.

Artificial Pasturage.

The areas of pasturage laid down in North Queensland are limited almost wholly to the Atherton Tableland and districts where, after burning off the fallen scrub, the seed may be sown without further preparation of the land. The grasses (in most favour are *Paspalum dilatatum*, Para (*Panicum muticum*), Kikiuyu (*Pennisetum clandestinum*), couch grass (*Cynodon dactylon*), and Rhodes grass (*Chloris Gayana*), all of excellent fodder value.

Complaint is made of the decadence of artificial pastures on the tableland, especially of paspalum, which have been laid down for upwards of seven years. Where in the first few years of growth a beast to the acre could be carried with ease, now two or even three acres are required.

The habit of paspalum when kept eaten down is to multiply the root system in an endeavour to cope with the demand made on the leaf supply. Roots close to the soil surface become matted, tending to strangle one another, and are impeded in performing their full functions, the result being a lower and lower supply of feed until even more than three acres are required for one animal. It is obvious that a breaking up of the pasture is necessary, and where this has been done the new growth has been much the same as when it was originally seeded.

It is also noted that where the matted roots have been destroyed by fire as in 1923, or by the caterpillar of *Oncepera Mitocera* alluded to in my last annual report, the subsequent growth has been remarkable.

Many settlers contend that the ploughing of their areas is extremely difficult, if not impossible, owing to steep hills, gullies, stumps, and logs, and desire experiments in top-dressing with fertilisers, with a view to finding something easy in revitalising their pastures. Soil on which the pasturage is grazed does not become appreciably depleted of fertilising elements, and the tableland soils which have been under pasturage only are considered still so rich in plant food that the application of fertilisers is unnecessary, and that if applied to a pasturage unable to take advantage of them would give a negligible result. Some good might be done by excluding stock from a pasture for a considerable period to allow growth to go on unchecked, when there would be a possibility of the decay of much of the impeding root system, under damp or shaded conditions, occurring. The loss of the use of this pasturage would have to be set against the cost of breaking up

the pasture, while the injurious set of conditions, causative of the trouble, could be expected to recur sooner there than on the broken-up pasture. Very little of the tableland is so steep as to be impracticable for it to be broken up with a single-furrow plough, even when it is only possible for ploughing to be done on the down grade.

Rototiller.

A self-propelled machine called a Rototiller suggests itself as likely to be of value in breaking up these pastures in situations of difficulty for horse traction. They do not take up the space of an ordinary plough and can be turned in their own length, and are propelled by an engine worked on petrol or kerosene, which also drives the machinery to break up or cultivate the soil. This machinery consists of a shaft around which are springs to which tines of sorts, including knives, can be affixed and which is called the "miller." The work is performed by the rapid revolutions of the "miller" causing the tines or knives to bite into the soil in a forward movement. The depth of operation in the soil can be regulated, while there are two speeds in the travel of the machine, the maximum being 1½ miles per hour. The rapid revolution of this miller with knives attached should effectively destroy the matted roots of any paspalum paddocks. The cost, however, of something like £250 will act as a deterrent, unless by practical demonstration a farmer or syndicate of farmers were fully satisfied with its efficiency.

Stylosanthes.

About twenty years ago a legume appeared in Townsville, probably being unwittingly imported from overseas in packing or other material, which has transformed an indifferent pasturage to one of value. The plant commonly known as wild lucerne, though it cannot be said to resemble lucerne in appearance, was identified many years ago by the Government Botanist as *Stylosanthes mucronata*. At the same time an analysis by the Agricultural Chemist denoted its feeding value as very little short of the true lucerne. The plant is of annual habit and seeds profusely. The seeds germinate more quickly on well-packed soil than in loose soil, and it spreads rapidly through natural pastures on the coast and Atherton Tableland, where so long as there is sufficient rainfall it provides an abundance of fodder. A defect in Northern pasturage, both native and introduced, is the absence of a legume to take the place of the clovers and the trefoils of the more temperate Southern parts.

Seed of Stylosanthes was distributed several years ago to all districts where it was thought likely to succeed, while it has also been carried by stock and other agencies such as railway trains, which have spread it over most of the lines connected with Townsville. It has been noticed in parts all along the coastal areas from Proserpine to Princess Charlotte Bay, at Mareeba and Atherton; so that it may be expected shortly to become universal in the pasturages there and to spread into the drier areas. This plant is considered a very valuable addition to Northern pasturage.

Black Medic.

The paspalum pasturage so popular on the dairying areas of the tableland has always been wanting in a legume to take the place of the clovers and trefoils of other climes, which in combination provide a more balanced ration and consequent greater production. Practically all the clovers and trefoils of which seed was procurable have been tried experimentally by this department without any encouraging results. The appearance of a legume growing and reproducing itself in a paspalum pasture at McGeehan Bros.'s farm near Kairi this year gives hope that, with Stylosanthes, the difficulty in finding suitable legumes has been overcome. This legume was identified by the Government Botanist as *Medicago lupulina*, commonly known as Black Medic, an annual plant, native of the Mediterranean region, but now cultivated or appearing in pastures in different parts of the world. It is new to Queensland, and Mr. McGeehan infers that the seed arrived on his farm with some Southern compressed fodder, purchased to feed a stud bull in the dry season, since it appeared only in the bull paddock. It is anticipated that seeds of this and other Medics will be secured for distribution and further trial.

Fodder Conservation.

During the extremely dry period in 1923 all stock owners were fully seized with the advantages of a store of conserved fodder to meet periods of shortage, just as they were in 1915 and 1919, and doubtless promised themselves that a future drought would not catch them unprepared. Notwithstanding the excellent

season, which has provided an unusually heavy supply of grass, these promises in nearly every case are not being kept, or with customary procrastination are being put off until next year. It is pleasing to note, however, that a little interest is being displayed by some of the newer selectors in the rolling downs country beyond Hughenden.

Silage.

With storage as silage, the advance, if slow, is steady among the dairy farmers around Charters Towers and on the tableland, many new pits being put down. The type of pit silo originally recommended by the department in soils where seepage of water is unlikely is most in favour. This type consists of a cylindrical pit the first four or six feet of which, only, is collared with a lining of corrugated iron bent to the circle and bolted or riveted, and which is plastered with a cement compo of 2 or 3 sand to 1 of cement, to a little more than is necessary to fill up the corrugations in the iron. This collar prevents the fretting away of the surface soil, while that below the collar remains firm. The actual cost of this form of silo is very little more than that of excavation.

While, on the tableland maize is the best and general crop grown, at Charters Towers, following departmental advice, most of the farmers are growing sacchaline sorghum for their silage in place of the maize they grew formerly.

Cassava *(Manihot sp.)* and Power Alcohol.

A good deal of attention has been directed to this crop as an auxiliary to molasses in the production of alcohol for power purposes. The crop could be grown to perfection in the north coastal districts of heaviest average annual rainfall, such as obtains from the Herbert River to Mossman. It is erroneous to suppose, however, as many do, that the crop will be very successful on poor land, or that the cost of growing and harvesting a crop under equal wages will be much lower than sugar-cane. The commercial possibility of the crop will depend on the value of the resultant product and its relation to the yield per acre with growing and harvesting costs.

In addition to the value of the crop for power alcohol, there might be some extra profit in the manufacture of tapioca for Australian requirements with the prevailing duty of 1d. per lb., or in the production of cassava flour or starch for use industrially, in which overhead costs would be lessened where power alcohol was also manufactured.

According to published statements attributed to Mr. Board, of the International Sugar and Alcohol Company, cassava roots compare in value for alcohol production with sweet potatoes, or arrowroot, as 20s. to 18s. per ton delivered at the distillery; this disparity, I am of opinion, would be more than compensated for by the lessened cost of production in sweet potatoes and arrowroot, both of which in North Queensland have yielded upwards of 20 tons per acre, and in the case of arrowroot upwards of 30 tons on the Atherton Tableland. The statement that sweet potatoes must be harvested as soon as ripe is contrary to Northern experience, since, with many varieties, the roots may be kept in the soil for upwards of a year, though, as is the case with cassava roots, the fibrous matter increases.

Much investigation is being made in the Cairns-Innisfail districts into the possibility of utilising the juices of surplus cane or the inferior grades of sugar in the manufacture with molasses of power alcohol under a bonus.

The over-production of sugar may be regarded as temporary, since as population increases the consumption may be expected to overtake the output on the east coast of the State, while, if the distillation of power alcohol is a success with cassava, sweet potatoes, or arrowroot supplementing molasses, there will be room for the cultivation of such crops over a collectively large area. In addition the growth of these root crops will be useful in a rotation with a legume in minimising disease and in keeping the soil in a better condition.

Instruction.

It is considered advisable in instructional matters to keep the department, as far as possible, in touch with settlers by personal visits to them on their holdings, when advice on the spot is of more value than correspondence. While the use of the horse, where hiring is possible, is insisted upon, locomotion in any district will necessarily be very slow, and will not allow of isolated settlers, or those at any distance from the various centres, being visited. These isolated settlers really require more attention, since they are unable to profit by the example of neighbours as is the case in more settled areas. Early in the year Mr. Hassell, Field Assistant

on the tableland, resigned his appointment to take up a more lucrative position outside the department, while Field Assistant Straughan after a period of illness was transferred to the Central district. The time elapsing between their respective departures and the arrivals of their successors, as well as that of initiating the newcomers in their work, took up a good deal of time, so that visits of instruction were much curtailed.

It is pointed out that if the instructor were provided with a motor car he would be enabled to travel round more expeditiously and do half as much work again as under present conditions.

CROPS, EXPERIMENTAL PLOTS, &c.

Cigar Leaf.

A greatly increased acreage was expected to be put under cigar leaf this season in the Bowen and Proserpine districts. Attacks of blue mould in the seed-beds at Euri Creek had a serious effect in greatly diminishing the areas under crop in that locality, while in other parts, though seed had been secured and the intention to plant expressed, very little was sown, for various reasons, chiefly on account of the good prices anticipated for sugar-cane. With a protective duty of 2s. 6d. per lb. on cigar leaf it is thought that a price in excess of this amount should be obtained, yet many growers report lower realisations with odd instances of a higher, but not in excess of 3s. per lb.

With a finer leaf and a better cure the price paid by manufacturers would no doubt be increased. At present the grower prefers a heavy yielding variety such as the Zimmer Spanish to other varieties, arguing that he will not receive any higher price for the leaf of another variety. This contention was proved some years ago when this department supplied seed of many varieties. With a better cure in the marketed leaf and the production of wrapper quality much higher prices should be realised.

At a price of 2s. per lb. growers at Bowen secure a good profitable return, for with plant and ratoon leaf the marketed yield is often upwards of 1,500 lb. per acre. Mr. H. Teitzel, Mount Dangar, Upper Don River, near Bowen, assures me of a return of £175 from three-quarters of an acre of plant and ratoon leaf.

While sugar-cane maintains its high price, and farmers as at Proserpine are not reduced in area, the cigar leaf will not meet the attention there that it warrants, except from those settlers who have to cart their produce a considerable distance. When a load of sugar-cane will represent a value of perhaps £4 and the same weight of cigar leaf upwards of £400, it will readily be seen that transport costs will greatly favour the latter.

In the Cardwell district it is thought cigar leaf can be grown of a good burning quality, which is the first essential. In this district, owing to limited milling capacity, cane-growing will be restricted, thus forcing settlers to turn their attention to other crops, among which cigar leaf is recommended strongly.

Green Fodder Crops.

The growth of fodder crops on dairy farms, to supplement the pasturage and to promote a greater flow of milk by feeding off in the young stages when the nutritive ratio is better balanced, has created a degree of interest that is gratifying. On many farms in the several districts, plots in summer and winter green feeds were planted as demonstration areas, giving very fine results where reasonable care and attention had been bestowed.

On the tableland under the extra humid conditions—there were 10 fine days out of the first 106 days of 1925—some rust was evident in some of the crops, but not to a very damaging extent.

Pearl Millet (*Penicillaria Spicata*).

Pearl Millet (*Penicillaria spicata*), condemned as a fodder by some people with insufficient experience, has proved its excellence in the young growth, when it is very palatable, at Charters Towers and the tableland, by greatly promoting the flow of milk. The yields of greenstuff are very high, one trial at Malanda, 55 days after sowing the seed, yielding 14 tons 9 cwt. per acre and the second growth after 36 days 12 tons 17 cwt., a total of 27 tons 6 cwt. in 13 weeks from sowing the seed, which is in excess of 2 tons per acre per week. Another trial at Kulara 45 days after sowing the seed yielded 9 tons 12 cwt. 3 qr., and a second growth from the same area cut 34 days after yielding 13 tons 13 cwt. 1 qr., a total of 23 tons 6 cwt. of greenstuff over 11 weeks, which is also in excess of 2 tons per week.

Teosinte *(Euchloena Luxurians).*

Owing to defective seed which failed to germinate this was again a failure. Past experience points to this crop as being of equal if not greater value than pearl millet.

Liberty Millet *(Setaria Italica).*

Under warm conditions this is a very quick crop, yielding well in several districts in the North. At Charters Towers, a crop sown on 8th December and cut on 16th January yielded 10 tons 6 cwt.; the second cut on 10th February yielded 13 tons 6 cwt., a total of 23 tons 12 cwt. greenstuff for nine weeks' growth. This growth, however, was under exceptionally favourable conditions. On the tableland the growth was not heavy, on account of so much rain.

Giant White Panicum.

Giant White Panicum suffered more from rust on the tableland than other crops, and with Japanese millet, its close relation, is considered to be of more value in districts of lesser rainfall.

Cow Peas.

Exceptionally heavy yields were obtained from the new varieties of cow peas—Groit, Brabham, and Victor—introduced last year. These varieties produce a much heavier growth than the varieties Black, Clay, &c., commonly grown, and occupy the ground for a longer period. Their value is very great as a green feed and as a roughage when cured as hay, to be fed in conjunction with ensilage to dairy cows. The following yields, it is thought, eclipse all previous records in the State:—

Groit Variety.—O. T. M. Hansen's farm, Carbeen, sown 28th November and estimated 10th February to yield 16 tons 11 cwt. greenstuff in 74 days from sowing, and on 17th April 22 tons 10 cwt. greenstuff in 140 days from sowing.

Victor Variety.

W. S. Allen's farm, Tolga, sown on 23rd January, yielded on 1st May 19 tons 5 cwt. 2 qr. 24 lb. greenstuff per acre 97 days from sowing.

Brabham Variety.

W. S. Allen's farm, Tolga, sown 23rd January, yielded on 1st May 18 tons 19 cwt. 1 qr. 4 lb. greenstuff per acre 97 days after sowing.

Velvet Beans.

Owing to heavy rains falling on the crop at Tolga last season when the pods were mature, very little seed was saved, and consequently areas under crop this year were not as large as anticipated, and were devoted to seed supply. The growth in all these plots is wonderfully good. It is anticipated that quantities of seed of three varieties will be secured for an extension of areas next year.

Horse Gram *(Dolichos Uniflorus).*

A small quantity of this legume, largely grown in India as a stable pulse, was secured from Ceylon and sown to secure further supplies of seed. It is fine in the vine, and gives promise of being a useful addition to Northern legumes.

Mung Bean *(Phaseolus Mungi).*

Seed of a variety of this bean, extolled in America as a wonderful producer of green forage, was secured, but has been very disappointing in the North, the yield being negligible.

Winter Feeds.

The crops sown in trials for winter green feeds in various centres of the tableland, Mount Molloy, Charters Towers, and Bowen districts did very well, as the following results of those estimated show:—

RAVENSHOE. FARM OF W. G. MCKAY. SOWN, 15TH MAY. ESTIMATED, 4TH SEPTEMBER.

	T.	C.	Qr.	Lb.
Soutter's Early x Warren wheat	7	7	3	12
Warrior wheat	7	9	1	24
Florence wheat	9	3	0	24
Warrior wheat and vetches	7	17	2	0
Warrior wheat and field peas	7	1	1	20
Dun field peas	9	17	2	20

EVELYN. FARM OF W. G. THOMAS. SOWN, 5TH MAY. ESTIMATED, 6TH SEPTEMBER.

Gem wheat ..	7	17	2	0
Bunge wheat	6	5	1	12
S. E. and Warren wheat ..	6	11	3	4
C. C. C. wheat	5	19	3	8
Warrior wheat	6	11	3	4
Florence wheat	7	17	2	0
Warrior and vetches	6	18	0	24
Dun field peas	16	11	0	0

MT. MOLLOY. FARM OF J. McDOUGALL. SOWN, 15TH MAY. ESTIMATED, 30TH AUGUST.

Florence wheat	5	3	per acre
Warrior wheat	3	11	"
C. C. C. wheat	3	14	"
Gem wheat	4	0	"
S. E. and Warren wheat ..	3	11	"

CHARTERS TOWERS. FARM OF DUTTON AND WATSON.

Warrior wheat and vetches	2	6	2	16
Florence wheat and peas ..	2	9	3	8
S. E. and Warrior wheat ..	1	10	2	4
C. C. C. wheat	2	3	1	16

NOTE.—No rain fell while this crop was growing.

BOWEN. FARM OF V. BOULTER. SOWN, 20TH MAY. ESTIMATED, 8TH SEPTEMBER.

S. E. and Warren wheat ..	4	0	1	12
C. C. C. wheat	3	10	2	24
Florence wheat	3	1	0	8
Warrior wheat	3	4	1	4
Florence wheat and peas ..	3	13	3	20
Warrior wheat and vetches	3	1	0	6
Golden vetches	4	0	1	12

Maize.

The growth of maize as a commercial crop in North Queensland is practically confined to the tableland, where a total area of from 15,000 to 20,000 acres is usually planted. This season from various causes, but chiefly owing to the lower price realised for the previous year's crop, a lower acreage than usual was cropped in the Atherton, Tolga, and Kairi centres, while many of the areas were sown so late that only a poor return from them may be expected. While the total acreage sown to maize during the season 1923-4 was greater than in any previous year, and a crop of approximately 20,000 tons obtained, of which some 18,500 tons was sold through the pool, it is anticipated that through the decrease in the area planted, as well as through late sowings, the output this year will be very much lower. An estimate made by an official of the Maize Pool Board places the crop as about 14,000 tons, but I am inclined to regard these figures as too optimistic.

As mentioned in my last annual report, the quality of the tableland maize has deteriorated from the interpollination of the many varieties, chiefly of the Dent type, introduced by newcomers.

Tableland conditions are very different from those obtaining in any other part of Australia, since the planting season occurs with the first storms of the wet season, in November and December, when, under a heated soil and humid conditions, a very rapid growth of plant follows, stalks frequently reaching a height of 14 feet; after the heaviest rains have fallen persistent light rains and mists prevail frequently until June or July, preventing a drying of the ripened grain and inducing moulds, with a consequent delay in harvest and damage to the quality of the grain. The forcing conditions operating to produce the tall stalk also induce the formation of a coarse pithy cob, which is also retentive of moisture and contributes to the difficulty in the drying of the grain.

It is obvious that the Dent types of maize, which are usually soft in nature and deep in grain, are entirely unsuitable under these conditions; in fact, these varieties when grown in an ordinary wet season produce a grain which, if not affected with mould, is chaffy in appearance and light in weight, it being frequently impossible to place 160 lb. in a corn-sack, even when well rammed.

A variety of Flint type is considered to be more suitable and has so been proved in past years.

The difficulty confronting the Department in introducing a suitable variety is the impossibility of keeping it pure unless it can be grown on a farm so isolated

that distance precludes all risk of interpollination. An endeavour to improve what was known as the Atherton maize variety by selection and "ear to row" tests proved futile, owing to the impossibility of preventing cross-fertilisation from other crops growing near-by. An instance was noted where a crop of a white-grained maize crossed with a yellow-grained maize at a distance of half a mile.

Given an isolated farm, under direct departmental supervision, where a chosen variety could be grown and kept pure, seed could be supplied to supplant the impure unsuitable strains now grown on the farms close at hand and then on those further away, until the whole area ultimately becomes seeded with the one pure and suitable variety. At the same time a higher yielding strain of this variety could be evolved by "ear to row" tests; fertiliser trials in series could also be undertaken.

Bare Patches.

On many of the tableland farms, where scrub originally grew, so-called "bare patches" occur varying in extent from a few square yards to an eighth of an acre, but rarely greater in extent, on which maize or other crops make little growth. Soils from one of these patches and from near-by, where crop growth was satisfactory, when analysed by the Agricultural Chemist, were found by him to be fertile soils, his opinion being that the soils of the bare patches appeared the better of the two. The analysis of the soil on the bare patch did not reveal the presence of a sufficient amount of a deleterious salt such as manganese oxide to cause damage, or any reason to advance in explanation of the poor growth thereon. An experiment was arranged on a farm at Tolga, where fertilisers including farmyard manure were to be applied: the various fertilisers were supplied by the Department and applied, but unfortunately the farmer did not fulfil his promise to supply the farmyard manure. On the plots under various mixtures of commercial fertilisers the result was negative, no improvement in growth being noticeable. It is thought that the "bare patches" are caused by the baking of the soil under the great heat engendered when big logs lay close together in burning off, after the scrub was felled, since on each of the patches much white ash is still noticeable and the analysis reveals more lime and magnesia than on the normal soil near-by. Possibly the destruction of the soil bacteria by this baking or the prevention of their multiplication by these ashes may be the cause of the trouble. It is a coincidence that on the forest soils where big piles of logs, almost wholly of eucalypts, are burned, crops grow to greater perfection in the first year or so than on the soil near-by. It is unfortunate that the farmyard manure was not applied to the plot as arranged, as this would have proved or disproved the theory regarding bacterial action being wanting.

Cotton.

The season as compared with those of the two previous years was much more favourable to the growth of cotton, while the damage sustained by insect attack was, except on one farm, practically negligible.

The areas under cotton during the past season were fewer in number than in previous years, but averaged a larger individual acreage and in general have given encouraging results in both yield and quality.

At Charters Towers the 70-acre crop of the Charters Towers Cotton Growing Company, which was planted late in last season and alluded to in my last annual report as having fair prospects if the winter were favourable, was visited with a severe frost before maturity was reached, resulting in a total loss of the crop. Although their capital was exhausted, the directors of the company with commendable perseverance collected their resources and with a small loan from the State carried on, ratooning some 60 acres of the frosted crop and planting about 30 acres additional. The ratoon crop started to mature cotton before the end of the year, picking being practically continuous from December onward. The quality of the ratoon cotton, from samples submitted to the Director of Cotton Culture, was returned as good and considerably above the average. To the end of May over 16 tons of seed cotton, which was estimated at about half the crop, had been sent away.

Extreme difficulty is being experienced by this company in harvesting the balance of this crop, owing to an unsatisfactory supply of suitable labour.

On the Lower Burdekin the Yturriaga Company had approximately 45 acres under crop on sandy soil regarded as too poor for sugar-cane. The quality of the cotton and yield of the crop, which had good cultivation under a fair season, directly confirms the oft-repeated statement that cotton, in common with other crops, cannot be profitably grown on poor land.

At Bowen a small area showed cotton of good quality, which would have been much improved in yield had better cultural methods been adopted.

In the Mareeba district at Emerald Creek the boll-worm caused damage to the young bolls and squares, resulting in a half crop; but at Carbeen little damage was

done, and a satisfactory yield obtained from a ratooned crop with equal promise from the plant crop.

On the Gilbert River an excellent showing was made with a crop of Durango both in yield and quality, which indicates that district with its thousands of acres of suitable soil as one admirably adapted for the production of large quantities of cotton when better means of communication are established.

In the coastal districts of heaviest annual rainfall, cotton has not been grown with much success when sown in November, December, or January, owing to damage to the ripening bolls by the rain. At Cardwell sowings have been made in April, May, and June of this year which will allow of the crop ripening during the drier part of the year.

Potatoes.

The experiments carried out by this Department during past years have demonstrated that potatoes can be grown profitably in the North during the season suited to the several districts. On the tableland, at an altitude of 2,000 feet and upwards, the crop can be grown most successfully during the height of summer, which corresponds with the wet season. On lower altitudes and on coastal areas the best success is met with planting from March to July, the later plantings being only possible in frost-free situations. Difficulty is experienced in obtaining satisfactory seed from Southern localities for these plantings, as well as in carrying seed over from one crop to another.

On the tableland the rains rarely fall before November and more frequently not before December. The best seed potatoes are unobtainable in these months, and if obtained earlier deteriorate under ordinary conditions to a large extent. When the soil is very dry, as in the tableland volcanic soils on the forest areas, it has been found advantageous to plant the seed in late August or September after it has well shot; the tubers then keep well and make a certain root growth but do not make growth above the surface until rain falls. The danger in this practice lies in the possibility of a fall of rain occurring to bring the growth above ground without sufficient following rain. This, however, is very rare, occurring only once there in the course of the last twenty years.

On the coast for March planting, selected seed of the quality offering in June and July is unobtainable, the practice being to obtain "smalls" from the commercial lots secured by merchants. The quality of this seed leaves room for much improvement, as Rhizoctonia, bacterial rot, &c., and leaf diseases are common on crops from this class of seed, while on selected seed, secured in July from reputable seedsmen, disease of any kind is infrequently met with.

With a view to improving the seed supply, experiments are being undertaken to see if it is possible to provide seed from the tableland crops for the coast and *vice versâ*. Under ordinary conditions immature potatoes could be dug on the tableland as early as late January that would be shot ready for planting on the coast in March, while seed from the crops on the coast could be dug as late as August which would keep in good condition until planted on the tableland in October or early November.

Seed of ten varieties grown under comparative trial this season at Tolga and Carbeen has been planted at Pentland, Woodstock, and Proserpine, where the crops are giving promise, but will not be ready to harvest until too late for recording in this report. Seed from these latter crops will be sown later on the tableland.

The yields of the varieties on the tableland grown at W. S. Allen's farm, Tolga, and O. T. M. Hansen's farm at Carbeen on forest volcanic soil, where the previous crop was a legume, were, per acre—

Variety.	Allen's Farm.								Hansen's Farm.							
	Saleable.				Small.				Saleable.				Small.			
	T.	C.	Qr.	Lb.	T.	C.	Qr.	Lb.	T.	C.	Qr.	Lb.	T.	C.	Qr.	Lb.
Carmen No. 1	4	9	3	20	—	9	3	8	3	10	2	24	—	7	3	12
Up-to-Date	4	3	1	16	—	14	3	8	4	16	1	0	—	9	3	8
Clark's Main Crop ..	3	19	1	24	—	14	3	8	1	3	2	8	—	13	3	0
Carmen No. 3	4	1	2	12	—	9	3	8	5	12	3	12	—	11	3	4
Victory	3	10	2	24	—	7	3	12	4	10	1	12	—	13	3	0
Scottish Triumph ..	2	7	0	22	1	9	2	0		Failure				..		
Coronation	2	13	0	4	—	17	2	0	3	8	3	0	—	15	2	24
Early Rose	2	1	1	0	—	8	3	8	—	8	0	24	—	11	3	4
Manistee	1	9	1	24	—	17	2	20	2	11	0	12	—	7	3	12
Sussex Red		Failure				..			2	7	0	24	—	11	3	4

At Hansen's farm the yield of some of the varieties was lessened through the depredations of vermin.

In previous comparative trials on the tableland the white-skinned varieties have invariably done best, Up-to-date and Carmen being consistently the best croppers.

Peanuts.

Due to the low price offering, the acreage under this crop has very greatly diminished. A duty of 4d. per lb. is operative on peanuts imported for purposes other than for oil extraction, yet the price offered the Northern growers has, as a rule, not been in excess of the duty but frequently under it. An inquiry into the amount of oil extracted from peanuts and the amount of peanuts imported for that purpose free of duty into the Commonwealth would appear to be justified in view of these low prices offered.

Plant Diseases.

Due probably to the favourable season promoting a vigorous growth—thus rendering the plants resistant to disease—the crops in the North on the whole were remarkably free from disease causing loss.

Sorosporium Reilianum.

Sorosporium Reilianum, or Head Smut, was prevalent on the farms where the affection was noted in the previous year, but not in all cases to the same extent, and must be expected there until rotation of crops is practised.

Blue Mould.

Blue Mould on Cigar Leaf was again in evidence in the Euri Creek district. This affection appears to be most prevalent during the wet season and is evidently induced by weather conditions. An experiment is to be undertaken this coming year by planting seed-beds at regular intervals, at the same time noting meteorological conditions in order to determine if possible causative agencies.

Urophlyctis Alfalfae or Crown Warts on Lucerne.

An instance of the spread of this malady by mechanical agency was noted on the tableland, where the knife-bar of a mowing machine dragging along a slight ridge in the field had carried the soil along and distributed the disease along the length of the ridge, while in other portions of the field the affected spots had not increased in size.

Insect Pests.

As is usually the case in a season favourable to growth, insect pests were not greatly in evidence.

Nematodes.

Cases of plants affected with this minute eel-worm, which causes galls or malformations on the roots of several species of plants, are not infrequent in tomato, potato, and other crops in the North, serious damage having been done to a few crops at Bowen and on the tableland this year. It is intended to carry out some experiments on affected land during the coming year.

LEVY ON HOMEBUSH SUGAR GROWERS.

Regulations have been issued under the Primary Producers' Organisation Acts in connection with a proposed levy to be made on producers of sugar-cane in the Homebush area, at the rate of 7d. per ton of sugar-cane delivered from the Homebush area to the Farleigh and North Eton Mills. Growers are given the opportunity of objecting to the making of this levy. If, on or before the 21st December, 1925, a petition is received by the Minister for Agriculture, signed by 100 or more growers of sugar in the Homebush area asking for a poll to be taken as to whether the levy should be made, a poll will be held, and if the majority of votes is against the levy, the levy will not be made.

The proceeds of the levy will be utilised for the purpose of defraying the cost of diverting cane from the Farleigh to North Eton Mill. The levy, if imposed, will be deducted by the managers of Farleigh and/or North Eton Central Mills from the final cane payment due by such mills to the sugar-cane growers concerned.

THE BANANA WEEVIL BORER.

(*Cosmopilites Sordidus* Chev.)

JOHN L. FROGGATT, B.Sc., Entomologist.

INTRODUCTION.

The Banana Weevil Borer problem is one of very serious import to the banana industry in Queensland, and hence special attention has been paid to economic entomological research into this problem, as a result of which a considerable amount of work has been carried out. Reports on the investigations have been published in the "Queensland Agricultural Journal" from time to time since 1921, but as the records are becoming rather scattered, it is purposed to bring together the information obtained to date from all sources in the following pages; some of it will be new, other portions will be a revision of matter already published.

As the literature and data available when these investigations were instituted was extremely meagre, the work had to be started from the beginning. The first matter for study was necessarily the development and habits of the insect, to ascertain whether it was more vulnerable to treatment, or natural enemies, at any one period more than another, and the conditions under which control measures might be expected to yield the best results.

Our knowledge of the distribution of the pest in 1920 was very slight, and is still far from complete, which is unfortunate, because too strong an emphasis cannot be laid on the fact that a knowledge of the exact limits of distribution is vital to any measures launched to combat the borer. It is too big a task, under existing conditions, for even a large body of men, and still more hopeless for isolated individuals, to examine every banana plantation in the State within a reasonable time, in order to determine whether the borer is present or not in each place. The greatest difficulty is frequently met with in any endeavour to ascertain from growers if the pest is present in their plantations; rather will they deny its existence in the neighbourhood, preferring the short-sighted policy of "hush-it-up."

We cannot shut our eyes to the fact that if the pest is not controlled, it will rapidly reduce the productivity of a plantation to a point at which it ceases to be profitable, and before this land can be replanted with bananas, all the old stools will have to be dug out and destroyed, measures will have to be taken to kill as many of the beetles as possible in the soil, and the area will have to be given a considerable spell, or placed under other crops often less profitable than bananas.

If this industry is to maintain its great position in the public life of the State the weevil borer will have to be coped with, and the longer the practical handling of the problem is delayed the greater will be the

difficulties that will have to be surmounted in its control. Not only will the area of dispersion and degree of infestation be greater, but the increase in the amount of plant material that will have to be cleaned out will be so tremendous as to be staggering; even one year's total will be enormous.

The general apathy that is shown towards this pest by the majority of growers is astonishing, the lack of interest in the weevil borer arising largely because, in the majority of cases, its depredations are looked upon as an unavoidable evil, and, moreover, one which will not do any great harm. There are, however, other growers who are striving to do their utmost to bring about its control, and of this minority there are many who have given invaluable help in testing out ideas under field conditions that the scientific investigator was unable to do owing to a complete lack of facilities for doing the work.

It behoves the growers, as a body, to do what they can to help rather than hamper the investigations, by co-operating, either individually or through their associations, instead of standing aloof.

One other note of warning should be sounded. Many intending growers set out on their way without even endeavouring to ascertain what pests they may have to guard against; the result is that later on very many come with a tale of woe after the borer, in particular, has become established in the young plantation. In many cases, at least, this could have been obviated if a little information had been sought before embarking on their venture.

Once this pest obtains a footing in an area, it is by no means a simple problem to master; only by constant vigilance and unremitting attention can it be brought down to a minimum, and, by sustained effort, be kept at that point. Control measures cannot be carried out for a short period and then be allowed to lapse if lasting benefit is to result, but must be continuous and thorough to be effective. The fact that there are two periods of the year when the beetles are comparatively inactive is of great assistance in this connection.

With adverse climatic conditions wreaking their devastating effects on the plantations, and decreasing, so seriously, the vigour of the plants, the effect of banana weevil borer infestation has recently come to be rather more generally recognised and appraised at its true value. The grubs working in the heart of the corm, which is the storehouse for the plant and, whence its food is distributed, undermine still further the vitality of the plant and cause a more or less complete breakdown of the stool. In spite of repeated warnings, most of those vitally concerned have been content to delegate any application of the most important matter of control to some indefinite future period. Last year, however, the fallacy of this action was demonstrated in so striking a fashion that the consideration of this matter could no longer be left in abeyance, and a considerable amount of useful work was carried out.

In the prospects of good seasons, however, lurks a grave risk of public opinion swinging around again and allowing matters to drift back to where they were before. This should be guarded against in every way possible, because if it does occur, the results will be disastrous.

PART I.

Life-Cycle Stages of Borer.

The following illustrations and short descriptions of the different stages of the life-cycle of the banana weevil borer should help a grower who is, as yet, unfamiliar with it, to determine whether any insect he finds about the stools is this dreaded pest or not. Should any doubt arise as to the identity of beetles found on the plantations, and the specimens are sent in to the Department, the fullest possible information will be readily supplied.

The imago (or adult) is barely half an inch long, and when mature, is black in colour and very hard. The thorax is covered with fine punctures, and the elytra (or wing covers) are striated longitudinally, and also finely punctated. In front of the head there is projected a fairly long rostrum (or trunk) and behind, the elytra do not quite cover the whole of the abdomen, leaving a small portion bare. The beetle is sluggish in movement, and feigns death on being disturbed. During this stage of the life-cycle no damage is done to the banana plant, the function of the adult being purely reproductive.

The egg is very rarely seen in the field, and a special search is required to find it. It is about one-twelfth of an inch long, and is elongate, oval, and pure white, thus harmonising with the plant tissue in which it is embedded, rendering it very hard to detect.

The larva (or grub) when fully grown is slightly more than half an inch in length; the body is creamy white and slightly curved; it is a stout, fleshy, legless grub with the middle to hind portion presenting a swollen appearance; the head is reddish-brown.

The pupa (or chrysalis) is a complete resting stage, during which the change into the beetle takes place. It is white and barely half an inch long; all the external parts of the beetle, legs, trunk, wings, &c., are plainly visible.

LIFE HISTORY AND HABITS.

The Egg.

The eggs are always deposited singly, and generally in the plant at about ground level, in a small burrow, slightly curved. The dying of the tissue surrounding the orifice to the egg chamber causes it to shrivel and flatten, the combined effect of these two factors being to practically completely close the orifice. The egg thus lies just beneath the surface in what is, virtually, a sealed chamber.

Very occasionally an egg has been found in the side of an old larval tunnel, or lying loose amongst the decaying leaf bases at the crown of the corm, or in a crack in a similar situation.

The greatest activity in oviposition is shown during the spring and autumn; September to November, and March to May being, as a general rule, the months during which the number of eggs deposited gradually increases (maximum in October and April) and then decreases as the extremes of temperature are approached. It does not absolutely cease at any time of the year, but the effect of the climatic conditions of winter appears to bring it to a lower rate than those of summer.

* *Vide* Plates 140 and 141.

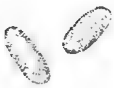


Fig 1.

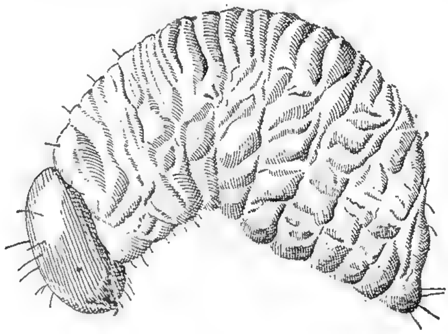


Fig. 2.

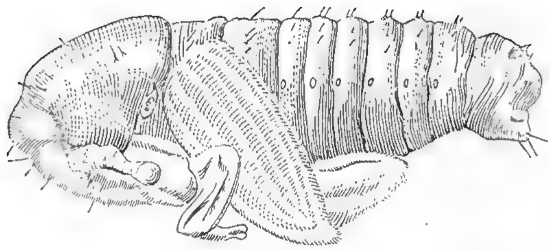


Fig 3.

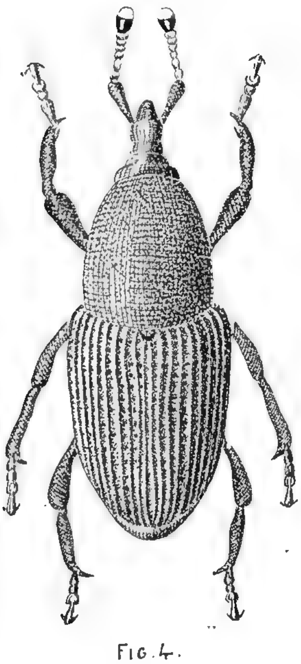


Fig. 4.

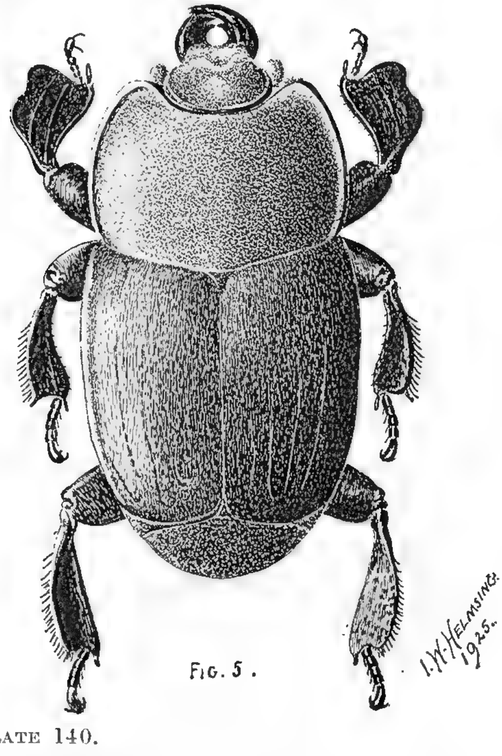


Fig. 5.

Plate 140.

Fig. 1.—Egg of Borer. Fig. 2.—Larva of Borer. Fig. 3.—Pupa of Borer. Fig. 4.—Adult Borer. Fig. 5.—Adult of *Plæsius javanus*, predator on the Borer. Magnified 4 diameters.

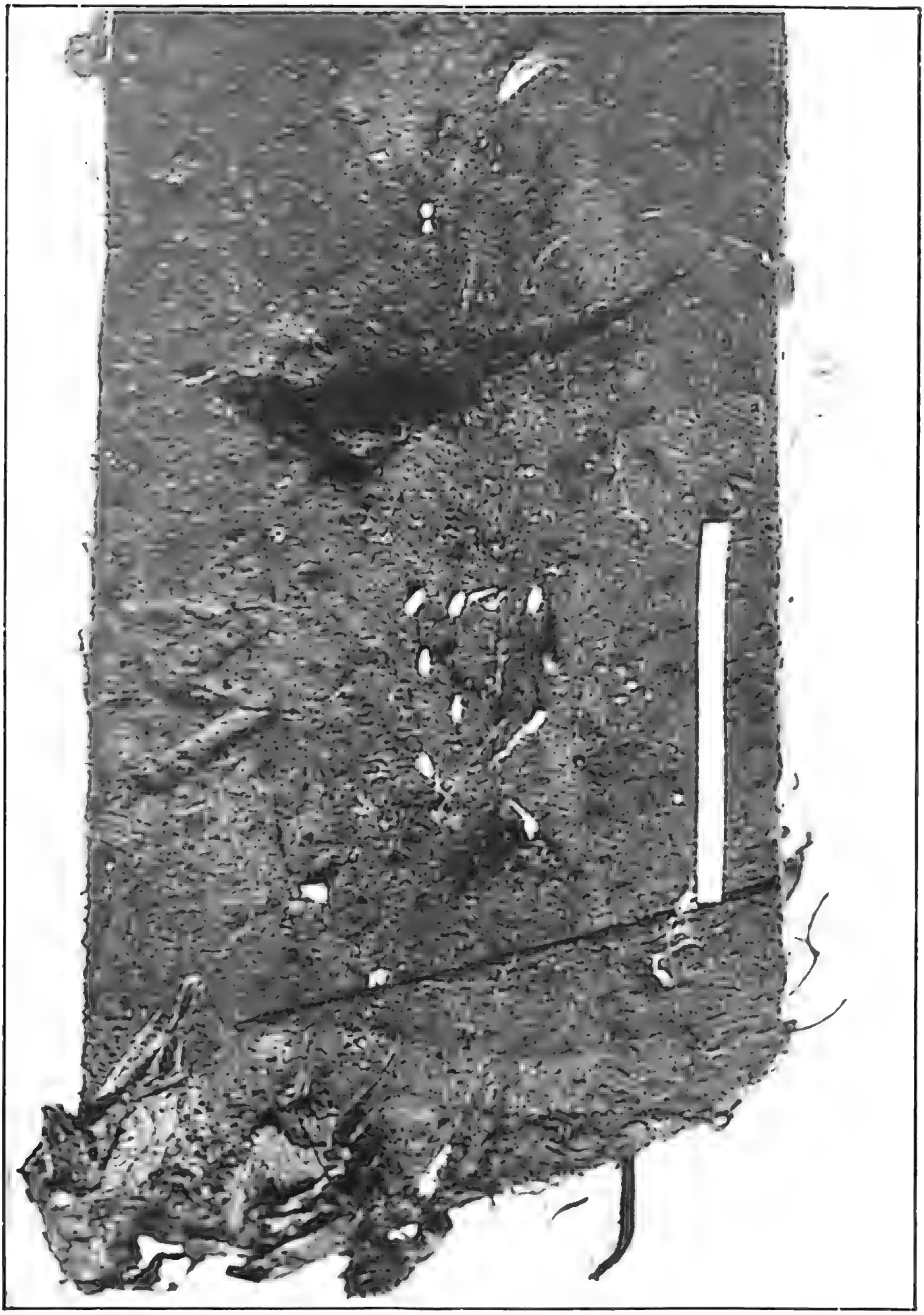


PLATE 141.—EGGS OF BANANA WEEVIL BORER TRANSFERRED FOR OBSERVATION.

The female, after selecting the site for the egg-burrow, eats out a hollow in the plant by means of the jaws in the tip of the trunk (or proboscis) in front of the head. She then turns round and through the ovipositor (a slender retractile tube situated in the tip of the abdomen) drops the egg into the chamber prepared for its reception.

The time that elapses between the deposition of the egg and the emergence of the larva shows wide variations under different climatic conditions such as are experienced with the changing seasons. From spring to autumn the average is about eight days, but the period has been extended in winter to over thirty days, and in some cases has fallen to about four days in the summer (*vide* Table A).

The development of eggs in the ovaries appears to proceed continuously rather than to occur in batches at intervals. This is best exemplified during periods of maximum activity, as the slower rate of development during the remainder of the year is liable to obscure this fact.

With the beetles under continuous observation, no sudden cessation, increase, or decrease in the number of eggs deposited has been noted, as should have occurred if batch development took place.

Deposition of eggs is continued practically till the death of the female, but the numbers appear to be greater in early than in later life.

From field observations on stems lying amongst the stools or between the rows, deposition of eggs was generally made within twelve to eighteen inches of the basal end and in the part resting on the ground. If any corm was attached to the stem, oviposition took place in the majority of cases approximately at the crown of the corm.

Eggs have not been found in the field in any plant portions showing decay, and in cases in which the larvæ cannot mature before the material in which they are breeding becomes rotten, they usually die; neither does the virility of the plant at any given time exercise any influence on the deposition of eggs in its tissue.

When deposited, the eggs are pearly white; after a time, varying with the period of the year, the apical (head) end becomes hyaline (clear), this ultimately extending to about one-third of the length of the egg. Shortly after this commences, the anal (tail) end also begins to turn hyaline, but this does not extend to quite the same distance towards the central point as occurs from the apical end. The clear anal area becomes opaque again, and the apical section turns cloudy. The next sign is the appearance of two very fine brown lines in the tip of the latter, representing the mandibles, these later being flexed into the normal position. Then the chitinisation of the other mouth parts appears, and later the plates of the head.

The Larva (or Grub).

When the grub is ready to emerge it cuts the egg envelope by means of its jaws, and, working itself free, begins to eat its way into the bulb. At first the tunnels are very small, but as the grub develops they gradually increase in diameter until they are about as thick as a lead-pencil; they are perfectly circular.

As the larva grows in size there comes a time when its skin has been stretched to the maximum, and it is thus prevented from increasing in

bulk. It then lies comatose for a short period, after which the old skin splits along the back (a new and larger one having formed underneath) and the larva is free to pass on a stage farther in its growth. This is termed a "moult" of which there are several before full development is reached. Throughout its life, it is a voracious feeder, devouring an amount of tissue equal to many times its own bulk.

It is during the grub stage that all the damage is done to the plant. Portion of its life is passed in the heart of the corm, the remainder being spent in the outer section. In both cases an enormous quantity of tissue is destroyed, representing in the former, food-storage capacity; in the latter, many root-origins are either damaged or cut through, causing the affected roots to die out. Not only does this lessen the amount of material obtained from the soil, which is built up in the leaves with other constituents into food for the plant, but also may, and does, in many cases, so weaken the hold of the plant in the soil as to cause it to fall out of the stool. Furthermore, in order to send out fresh roots, stored food has to be drawn on, and used up, to provide the necessary material for such development to take place. Thus by preventing the plant forming and storing the amount of nutriment required, not only to maintain the plant in full vigour but also to produce the best quality and the greatest quantity of fruit possible per bunch, this pest causes a very considerable reduction of profits to the growers. In one case recorded, some plants in an old abandoned area were endeavouring to throw a bunch, but had only sufficient vigour to develop half the first hand, and, in odd cases, one or two fingers on the second. The grubs of the banana weevil borer had riddled the butts, and travelled two to three feet up the stems in many of these plants. Although it is a remarkable example of the vitality of the latter, it is a striking condemnation of allowing plantations to ever arrive at such a pitch of neglect, and illustrates further what havoc the borer will do if allowed to increase unhampered.

The attack of the grub may even bring about the complete loss of the plant before it has thrown a bunch. Decay of the plant tissue often develops along, and spreads out, from the larval tunnels, thus bringing about still further destruction of the corm.

During protracted dry weather, when the plants are striving against adverse growing conditions, the effect of the borer undermining the remaining vitality of the plant brings about a more or less complete breakdown of the stool far more rapidly than would occur in a normal, or good season, while a plant in poor vigour shows the effects of infestation far more rapidly than one in strong growth.

In badly infested plantations, it is by no means uncommon to find very few suckers coming away, those that are produced being poor and weedy. This is another serious effect of the borer, as the continued prosperity of a plantation depends on the growth of good healthy plants.

Suckers have been found in badly infested plantations that, when pulled, snapped off about three inches above the ground, often exposing a grub and exhibiting a complete internal girdling. In other cases it has been observed that the larvæ have traversed the central core of the sucker from the bulb to the unfolding leaf, causing the complete destruction of the plants so affected. It will also often be noticed that larvæ have tunnelled from the parent corm into that of the sucker given off from it.

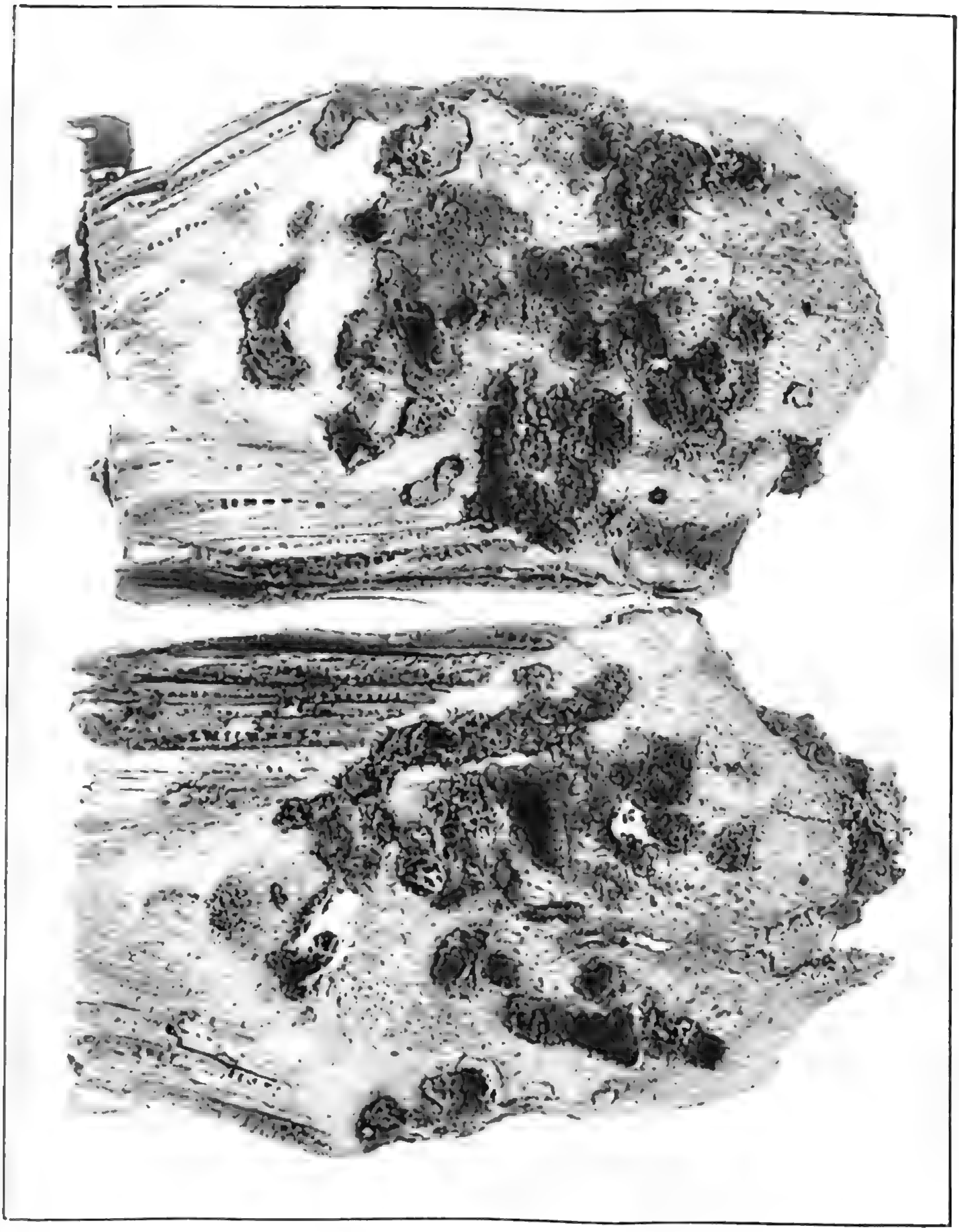


Plate 142.—Banana Sucker, about 3 months' old, showing Severe Infestation by Borer.

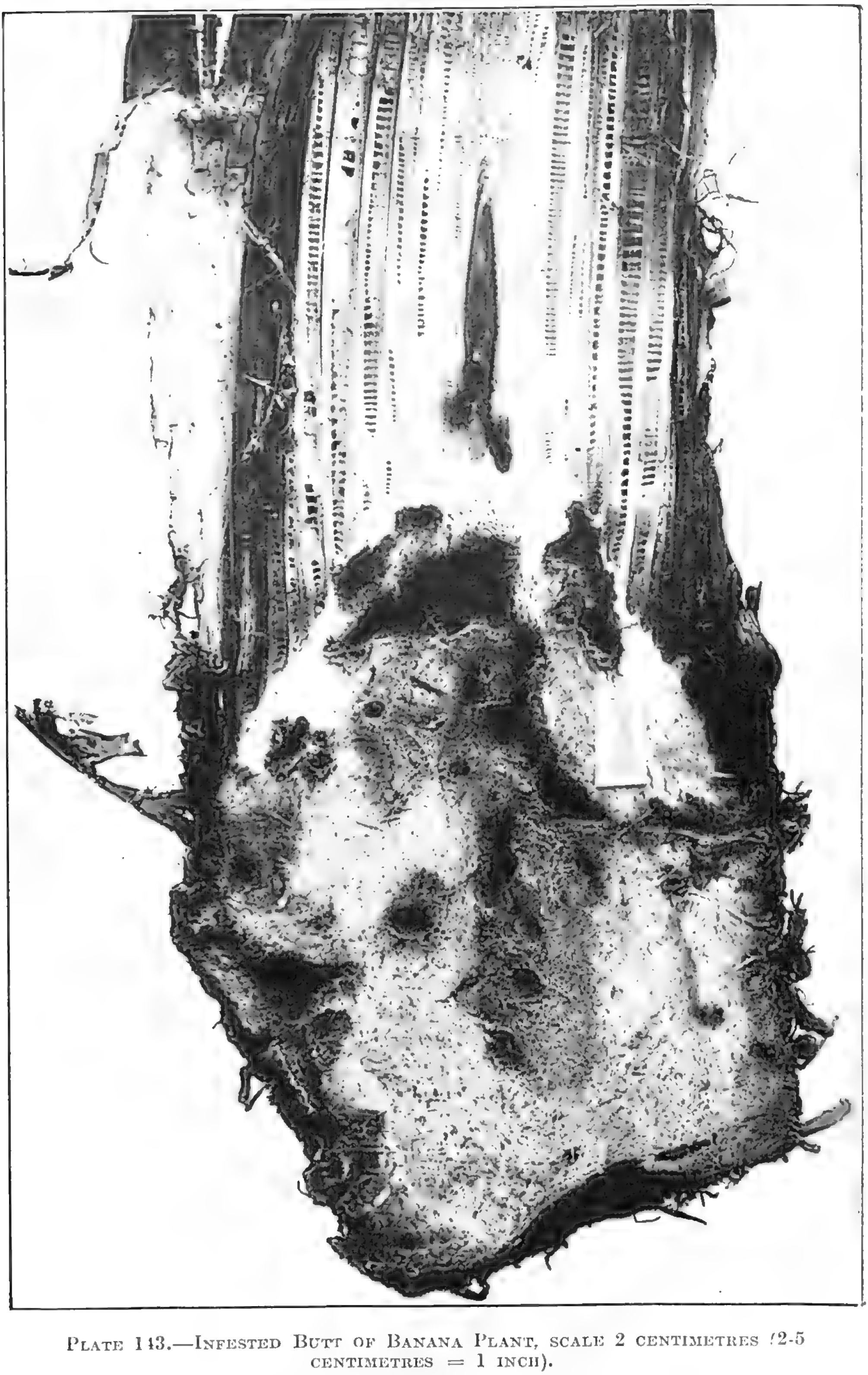


PLATE 143.—INFESTED BUTT OF BANANA PLANT, SCALE 2 CENTIMETRES (2·5 CENTIMETRES = 1 INCH).

Note 1.—Tunnelling in outer and inner portion of corm.
Note 2.—Plant decay spreading from grub tunnels in heart of corm.
Note 3.—Destruction of central core of plant by grubs.

In Queensland, the Cavendish, Sugar, Lady's Finger, Plantain, Gros Michiel and Dacca varieties of banana plants have all been found to suffer from the attacks of the banana weevil borer. The Dacca especially, and to a somewhat less extent, the Gros Michiel, are rarely met with, and the Sugar variety is becoming scarcer, owing to its susceptibility to "Panama" disease; the Cavendish is the principal one grown. Comparatively speaking, all these varieties appear to be affected with the same relative frequency.

The question of relative injury to the different varieties is rather difficult to determine, as they do not all flourish under similar conditions. It can, however, be stated that the destruction wrought by this pest in all of them is considerable, and where two or more are growing together, there does not appear to be any appreciable difference in the amount of destruction caused by the borer in the different varieties.

A knowledge of the plants in which this pest will breed is of the utmost importance. So far, in Queensland, it has never been found developing in any plant other than some species of banana (Musa), although in Fiji it has been reported to have been found in sugar-cane. This matter of hosts other than banana is receiving careful attention.

The effect of climate, or geographical location, does not appear to affect the depredations of this pest. It occurs through the tropics well down into the sub-tropical regions, and is as prevalent and destructive on mountain ranges as on lowlands, both at a distance from and along the seaboard.

Although, as a general rule, the grub of the borer does not extend its tunnels more than a few inches at most above ground level in a growing plant, soon after the bunch has been cut, if the old stem is left standing in the stool, they will very often travel well up into it if not along its whole length. The numbers met with in these cases are often large. It is the central core (*i.e.*, the bunch-stem) that is particularly traversed, but they will also often tunnel through the leaf bases comprising the remainder of the pseudo-stem.

Old corms in the stools will sometimes be more heavily infested than the standing plants, and are therefore acting as select breeding grounds (which are generally never interfered with) for the pest to multiply in; by these means, the beetle population is greatly augmented in the very spot that it is desired to keep as free as possible from the pest—namely, the heart of the stool.

The actual monetary loss due to weevil borer is, under present conditions, at any rate, impossible to put down in figures, as it depends on factors each of which is individually so difficult to estimate.

Firstly the period over which a plantation will remain commercially productive, quite apart from any consideration of pests, is very greatly influenced by conditions of soil and rainfall, both of which are so extremely variable. Secondly, the actual reduction in the number of fruit per bunch directly attributable to borer infestation is more often than not in the nature of a more or less gradual, rather than a sudden decrease, due to the slow but steady undermining of the vitality of the parent plants. Thirdly, the actual diminution in the quality of the fruit produced is influenced in a similar manner to the second factor.

Although an approximation might be arrived at, it would take a great deal of careful study, and the expenditure of a considerable amount of time, to obtain sufficient data from which conclusions might be drawn and figures obtained.

It is virtually an impossibility to determine the actual amount of damage that can be ascribed to a single larva under laboratory conditions with the extremely limited facilities available. In the field, determination of this point is complicated by two principal factors. Firstly, there are generally two or more larvæ, mostly in different stages of development, present in the bulb or stem. Secondly, in some cases, the grubs remain more or less in one part of the bulb, virtually eating that section out, while, in others, they wander in all directions.

A general idea may be obtained on this point in an indirect way. As many as thirty-five larvæ have been taken from a single corm about 9 inches by 13 inches in size, that was virtually honeycombed by their borings.

One peculiar habit of the larva only recently recorded is worthy of note. On three separate occasions occurring in the months of December, May, and June, larvæ have been found burrowing in the stalk of the bunch outside the plant. It was evident that they had not tunnelled through from the heart of the plant. This is certainly exceptional, and any information on other such occurrences known to growers would be welcomed.

As the grub moves forward, the tunnel behind it becomes more or less tightly packed with waste fibre and excreta; on account of this barrier, any control by natural enemies is very seriously hampered, and from the observations to date, natural enemies, either animal or plant (fungus) do not appear to play more than, at most, a very insignificant part in checking the increase of the pest in this State.

As the grub approaches maturity, its tunnelling turns towards the outer surface of the bulb, and, when full fed, it comes to rest in the end of the tunnel, lying with only a very thin layer of corm between it and the soil.

The period passed in the grub stage shows wide variations under different climatic conditions. During the spring and autumn it is about forty days, whereas under winter conditions it is extended to well over 100 days, and in summer it has fallen to as low a figure as twenty-five days (*vide* Table B).

When the larva is full fed, it lies comatose in the end of its tunnel, the body becoming flaccid and elongated and the thoracic segments showing up more prominently. This dormant or pre-pupal period lasts for from one to three days (*vide* Table C), when the larval skin is cast exposing the pupa.

The Pupa (or Chrysalis).

The pupal chamber in the corms has always been found situated below ground level and just underneath the surface of the bulb. In cut stems the site varies considerably; although it is generally close to the outside layer, it has been observed as far as two inches in from the surface in cases of very heavy infestation.

No cocoon is formed, but occasionally a few strands of fibre have been noted in the tunnel end of the chamber; this is, however, exceptional and generally occurs in rather dry material, or where pupation takes place in the tissue of the leaf bases.

The period passed in this stage, although variations have been found to occur, has fluctuated very little from an average of about eight days (*vide* Table B).

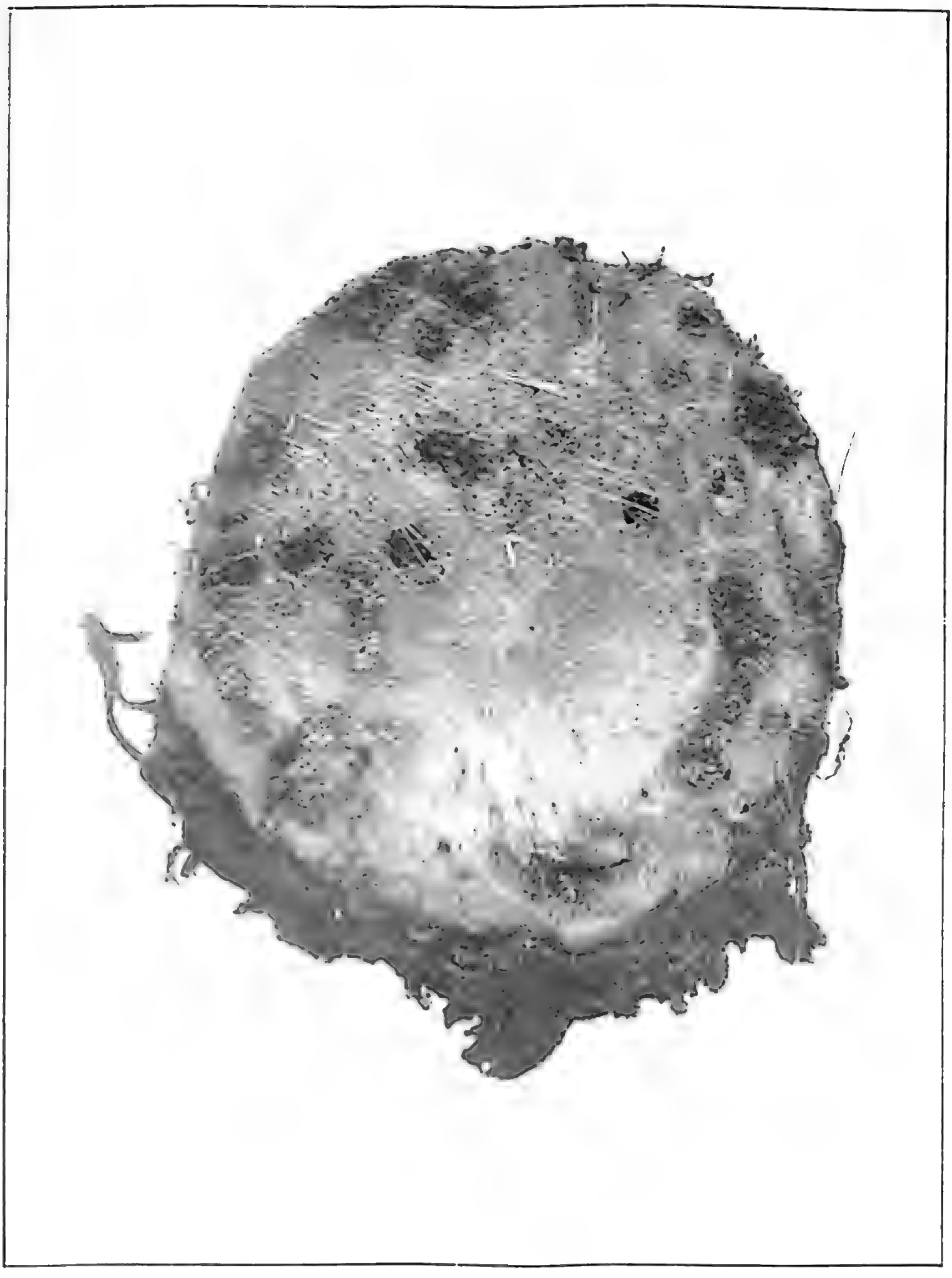


Plate 144.—Infested Banana Corm, showing Grub Tunnels.

About one to two days before the completion of the pupal period a faint colouring of the joints of the legs is first noticed, followed a little later by a similar darkening in the plates of the head. This gradually spreads and deepens in tint until the whole body is of a lemon, or light reddish-brown which is the colour of the beetle on transforming from the pupa.

Duration of Life-Cycle.

The time taken for the completion of the life-cycle (deposition of egg to emergence of beetle) must necessarily show very great variations, being shortest in the summer and longest in the winter. The maximum recorded is 180 days, with a minimum of twenty-nine days, and an average of forty-seven days. The figures in Table B give detailed records extending over portions of just over three years.

The data from which the figures in Tables A, B, and C have been compiled were obtained from a long series of observations carried out in the laboratory. The eggs were obtained by paring the pieces of corm on which beetles had been feeding for a known time, and transferring those that were exposed undamaged to incisions made in larger portions where they could be kept under closer observation. They were covered over with thin layers of plant material, renewed periodically. The larvæ, as soon as possible after emergence, were placed in small holes made in slices of corm, which were then set aside in separate tins and the food changed as required. By this means comparatively close observation could be kept on the larvæ throughout their lives. A very large number died, through a variety of causes, but a sufficient number matured to enable a fair series of records to be made.

The Imago (or Adult).

After transforming from the pupa the beetle is very soft, and remains quiescent in the pupal chamber for several days; during this time the body hardens and darkens. The time passed in this more or less comatose condition in the plantation can only be arrived at indirectly, and probably more or less approximately, owing to the variation from normal in the laboratory conditions. It has thus been found that, after emergence, the weevils do not show any marked inclination to feed for about a week, but do not attain their full colour for an average of about fourteen days. This latter period is, however, variable, having in some cases extended over thirty days, and in others been reduced to about six days. When ready to commence activity the beetle eats its way through the thin coating of corm and enters the soil, in which it passes the major part if not the whole of its life. It may, and often does, pass into rotting banana plant material, but does not re-enter the standing plants except under special circumstances, and then only for shelter where a cavity has been formed by previous borer attack or mechanical injury.

Periods of Emergence.

The greatest emergence of imagines probably occurs in May and November, but pupæ have been collected in the field in practically every month of the year, so that these two months cannot be considered as the only times during which beetles are breeding out.

Longevity.

Observations on the length of life of the imagines prove conclusively that it is a long-lived beetle, but the effect, if any, of annual or seasonal variations of climatic conditions on this matter cannot yet be definitely stated. Beetles collected in the field have shown a life period of as long as seventeen months when fed continuously. Table D gives a summary of the records of observations. As the age of the beetles when collected was indeterminate, great differences may naturally be expected, and these (average) figures can ony be considered a minimum.

The averages for beetles bred in the laboratory are given in Table E, which shows that individual records have gone as high as 748 days. A very high rate of mortality has occurred throughout this series, death often ensuing within a few days of emergence. The beetles, after leaving the pupæ, were supplied with food continuously, and in most cases were kept singly. This rate of mortality was at its maximum under moist conditions; the beetles were, of course, under most unnatural conditions when newly emerged, especially as the corm at times developed moulds soon after the slices were placed in the tins with the weevils. The highest death rate amongst the beetles collected in the field, and kept in the laboratory, occurred between January and April, being more particularly marked in March and April.

The beetles succumb very quickly when exposed to heat in such a way that they are unable to escape. Exposed on a piece of tin with upturned sides to the heat even of the sun in the hotter portions of the year, the weevils will turn over on their backs almost at once, and, after waving their legs about for a few seconds expire.

Under starvation conditions, the length of life is short when the soil is dry, being only a few days; when the soil is kept damp, however, it may extend to about six months (*vide* Table F). This point will require further investigation in order to determine what divergences, if any, occur at different periods of the year.

Tests have been instituted to ascertain whether the starvation of the imagines over varying periods of time has any influence on the development of eggs and the rate of oviposition, but this work has not yet progressed far enough to warrant any deductions from the data obtained.

The period over which the beetles may live under conditions of starvation, and also of submergence in water, may be influenced by their age. As all the tests were carried out on beetles collected in the field, the age of which was, of course, unknown, the influence of this factor can only be inferred from other observations, but how it would react is problematical.

Emergence to Oviposition.

The period from emergence to mating and thence to oviposition has been found to vary enormously. The reason for this has not always been apparent, but a factor that does seem to exercise some influence is the time of year at which the imagines emerge, regarding as to whether this occurs just prior to or early in an active period, or late in an active period or early in an inactive one. Further data are required to determine the extent of the variations and the influencing factors. Some results of observations are given showing dates and periods in Table G.

Powers of Movement.

The beetles move normally over the soil and in the air only at night, but they move beneath the soil even by day. In dull weather, immediately after rain, it has been recorded that the beetles have been seen crawling on the surface by day: from the data in hand it would seem that this is not of general occurrence.

Effect of Light.

A considerable amount of work was done on the effect of light on the adult beetles. A twenty candle-power electric bulb connected with a small accumulator was used as the source of light. The bulb was set in a closed container fitted with a reflector, and a narrow beam of light was passed through a glass vessel containing coloured fluid. A number of different colours were tested. The beetles were exposed within the arc of light and their movements closely observed. By their actions it was readily seen that they were most strongly abhorrent of light, particularly a bright one. It was only under such a feeble beam as to be almost too dark to see the weevils clearly that they manifested any inclination to stray in the light, and then only for a short time, ultimately crawling away into the dark. Where they were exposed on soil, they burrowed down rather than crawled away.

Flight.

It has now been definitely proved that the beetles fly, but to what extent this method of migration is exercised still remains to be ascertained. So far, no instance has been recorded in which two or more beetles have been observed in flight together, and in every instance normal flight has occurred on warm muggy nights, shortly after dusk for the most part, between the latter part of November and the first half of April.

The difficulty of collecting information on this matter is one of the greatest experienced in the whole course of the investigations, and it is most earnestly desired that any growers observing the beetles actually in flight, or even in such a position as would lead to the natural supposition of flight, would send in details of what they saw—especially time, date, weather conditions, distance from banana stools, whether these would lay uphill or downhill, &c., and whenever possible, the beetles themselves in a small tin. Any such assistance would be greatly appreciated.

Submergence in Water.

The possibility of utilising excessively wet conditions as an aid to the destruction of the mature beetles is discountenanced by the results of a series of tests carried out by totally submerging the beetles in tap water. Eleven days under such conditions had practically no effect, 90 per cent. to 100 per cent. coming through alive. This, though surprising at first, is not so remarkable when it is remembered in what very wet situations they are found in rotting butts and stems in the plantations.

Food of Beetle.

The food of the adult weevil is undoubtedly the substance of the banana plant. In one instance an odd beetle was found feeding on a

potato tuber, and also on a bulb of the "arrowroot" plant (*Canna edulis* Edw.). In both cases the crops had been growing alongside infested banana plantations, and had been dug out, odd tubers and bulbs lying about the field.

Egg Development.

The seasonal effect on the development of eggs is very marked indeed. On the approach of summer, within three or four days of the first hot spell there is a sudden diminution in the number of eggs laid, and in the height of summer oviposition may almost cease. As soon as milder climatic conditions are experienced, a gradual, but appreciable increase in egg laying is observed, which reaches its maximum usually in the beginning or middle of April, decreasing as cooler conditions prevail until it again almost ceases, and if the winter be a severe one may do so completely. Following very closely on the first few consecutive warm days in the latter end of August, a steady increase commences, and reaches its maximum in late September or early October. If a few cool days occur together in summer, or a few warm ones in winter, a slight temporary rise may occur. From field observations made by certain growers, the laboratory records have been proved to approximate very closely indeed to the conditions occurring in the plantations.

Reaction to Baits.

The reaction of the beetles to "baits" in the field follows very closely their activities regarding oviposition. During the periods when this rate is high, imagines, often in considerable numbers, are to be found under any piece of banana plant lying on the ground. During the height of summer and more particularly the depths of winter very few beetles are to be obtained in this way.

As a result of field tests with "baits," it has been found that the number of beetles caught in and immediately around the stool is far greater than those trapped further away; this is more particularly in cases where old plant material is kept cleaned up. Where there is plenty of shelter in rotting material all through the plantation, the imagines will naturally be far more generally scattered throughout the area.

It has been noted on many occasions that immediately after heavy rain or general wet weather, the number of beetles found under baits shows a very marked decrease, but rises again usually about two days later. Where they disappear to during this time is not known.

Abnormal Oviposition Site.

That the females may, under certain ill-defined conditions, burrow well down below ground level to deposit eggs in the plant is evidenced by the fact that occasionally infestation will be found only in the lower portion of the corm, and be absent towards the crown. This is, however, much more the exception than the rule. On steep hillsides, where erosion has often more or less exposed the bulbs for a considerable distance down, a great enticement is offered for low oviposition, but it is not invariably found to occur in such situations, and has also been observed on flat country.

Breeding in Old Plant Material.

The beetles breed freely in stems cut off and left lying on the ground, as also in old corms in the stools. They shelter and probably feed in any rotting banana plant material, both that lying on the ground or standing in the stools, as long as it is moist. Decaying butts are especially favoured, as many as thirty-nine beetles having been taken from a sngle one, and as many as 100 grubs, pupæ, and imagines have been taken from a cut stem lying on the ground.

Natural Enemies.

The matter of ascertaining and, whenever possible, developing natural enemies has so far not met with any appreciable success.

An Elaterid ("Skipjack" or "Click-beetle") larva was found by H. Tryon in a district along the North Coast, and again met with in the same locality in 1921 by the writer, when a single larva was found in an old corm after a considerable amount of searching, with a partially consumed imago of *C. sordidus* in its jaws. This predaceous larva does not appear to be in frequent association with the banana weevil borer, and most likely does not confine its attention to this host. As there does not appear to be any noticeable diminution of the pest in this area, it cannot be claimed that, so far, this predator is doing any great amount of good.

An Histerid (*Plaesius javanus*) was found by Muir to be a natural enemy of the banana borer in Java in 1908. In 1922 a small lot of these beetles (304 alive on arrival) were imported to this State; in 1923, four other consignments, totalling 750 live imagines, were introduced and liberated in a small plantation in which the borer was very prevalent. So far there is no evidence to prove that these beetles have become established in Queensland. It is a rather flat, black, shiny beetle, somewhat oval in outline; the jaws are very prominent, projecting forwards, and the wing-covers do not reach quite to the tip of the body. It is about half an inch long, and about one-third of an inch in width. It is hoped to proceed further with the liberation of these predators in order to test thoroughly their possibilities as a control factor.

Reaction to Attractants and Deterrents.

Although a large series of tests have been carried out with various chemicals with the object of ascertaining whether any of them showed attractant properties towards the beetles, no positive result at all was obtained.

From the point of view of deterrents, a few essential oils were found to act as such for a short period of time and over a very limited distance. Oil of peppermint showed the strongest action of those tested. Limonene also gave similar reaction, but to a lesser extent; in no case was this power sufficiently strongly developed to enable it to be applied in the field. The only substance tested to date that in any degree fulfilled such essential conditions is paradichlorobenzene ("Dichlor"). Laboratory experiments have shown that when a few grains of this chemical were sprinkled on the bottom of a tin, and covered with soil to a depth of four inches, beetles buried three inches down appeared on the surface within two to three hours, whereas under similar conditions without the chemical there was no appearance of the weevils on the surface within eight hours

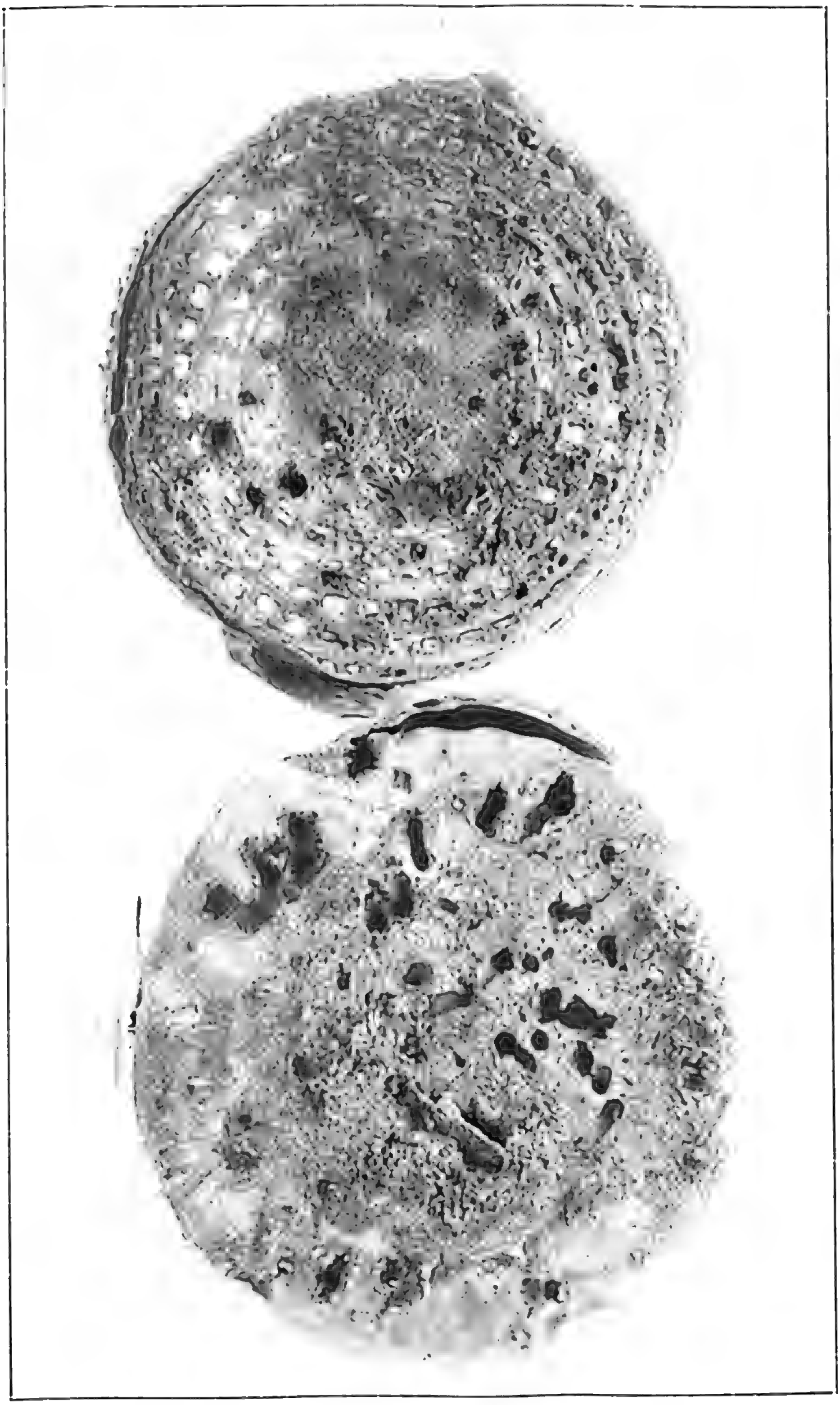


PLATE 145.—OLD BUTT OF BANANA PLANT SHOWING SEVERE INFESTATION BY BANANA WEEVIL BORER.

PLATE 146.—CUT STEM (CROSS SECTION) OF BANANA PLANT SHOWING MARKED INFESTATION BY BANANA WEEVIL BORER.

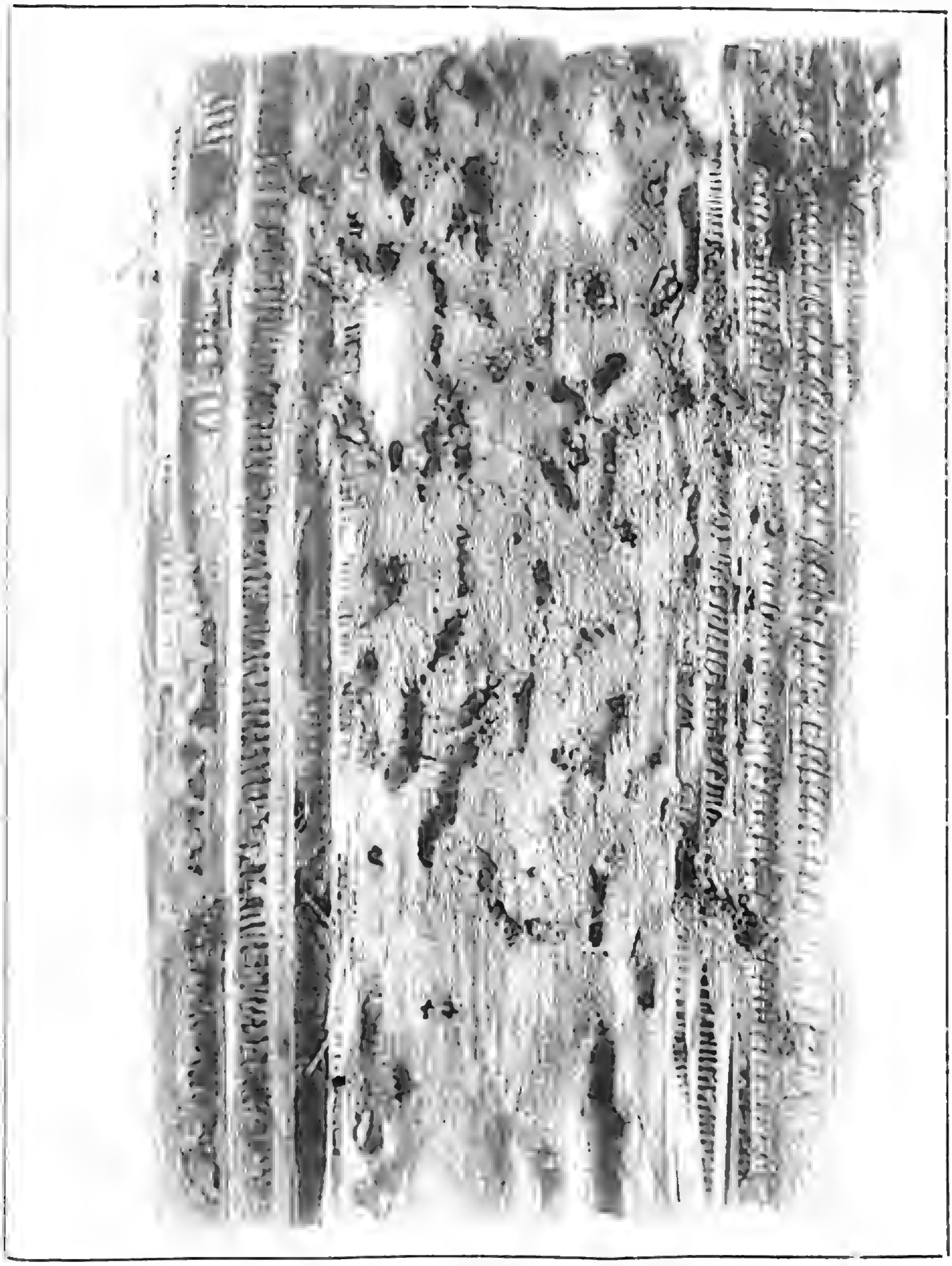


Plate 147.—Cut Stem (Longitudinal Section) of Banana Plant showing marked infestation by Banana Weevil Borer.

after the commencement of the tests. It thus, at a very low concentration, even with an upward diffusion, rapidly drives them out of a confined area. The odour was quite noticeable in the dry soil fourteen days after treatment. In a closed space the vapours of this chemical are deadly on both the imagines and the larvæ of *C. sordidus*—on the former within thirty-six hours, and on the latter, in thin slices of corm, in about twelve hours.

Other experiments with this chemical show that the downward rate of diffusion is much more rapid than that upward.

Reaction to Poisons.

A large amount of research work has been done on the lines of the effect of poisons on the adult weevils using banana corm as the means of conveying the chemical to the beetle.

It has been found that the time of year exercises a great influence on the lethal action of the chemical used, the rate of mortality resulting from poisoning being less in the winter than the summer, and being highest during the periods of spring and autumn.

Both solutions and dry powders were used, all the former and most of the latter tested to date proving unsatisfactory.

Paris Green and Sodium arsenite (powder) have, however, given highly satisfactory results, and Borax, Arsenic trioxide, and Calcium arsenate have killed a large percentage of the weevils exposed to their action. Paris Green has proved to exercise the greatest lethal action over the shorter periods of time, Sodium arsenite being next in order. By reference to Table II it will be seen that in the laboratory experiments with the former, over 97 per cent. of the beetles exposed for a period of three to twenty-four hours to the material treated with this chemical were killed, while 74 per cent. were killed when Sodium arsenite (powder) was used over the same time.

With the solutions, it appeared that the low rate of mortality was due to lack of a sufficiently high concentration of the poison on the surface. With the dry powders, on the other hand, this reason cannot be ascribed for the results obtained.

The procedure used in the laboratory was as follows:—Small pieces of corm were steeped in the solutions, or shaken up in the dry powders, for from 1 to 20 minutes with the former, and from 5 to 20 minutes with the latter, and placed in separate tins over sifted soil. An equal number of weevils were then placed in each tin and left with the poisoned material for varying periods of time, at the termination of which fresh, untreated, corm was substituted for the treated portions. Observations were made from day to day to ascertain the number alive. Small tins, 4 in. by 3 in. by 2 in. were used for this work. The diluent mixed with the dry powders was in every case wheaten flour.

As already indicated Paris Green has proved to be the most active poison tested to date, followed by Sodium arsenite. When one part of Paris Green was mixed with six parts of flour it was found that the percentage of beetles killed so closely approximated that obtained by using the pure poison, although it was slightly less, that for working conditions the saving in cost by using the mixture far outweighed other considerations.

Tests have been started with mixed poisons to ascertain whether any differences occur in their action compared with that of the simple substances, and, if so, whether the former have advantages over the latter or not. So far the results do not show any such advantage, although much yet remains to be done before the work is complete. A summary of the main results is given in Table H.

The value of a suitable poison in the scheme of control is enormous, if only in the saving of time and labour necessary to examine untreated baits. The best indication of this is given by the large number of growers that are now using "baits" treated with Paris Green.

Modes of Dispersion.

It is often extremely difficult to obtain the absolute facts of the distribution of this pest. Odd instances, generally quite localised, present features which can apparently only be explained by either flight, or mechanical or accidental transportation, other than by suckers.

The dispersion of the pest may be brought about in one or more of several ways.

1. By transportation of suckers from an infested area. By far the greatest number of the occurrences of the pest are directly traceable to this means, which is a very difficult one to obviate under present conditions.

It is, of course, highly desirable that suckers should be obtained from an area which is free from the pest. When this is not done, certain precautions must be taken. Plants showing any signs of borer attack should not be taken for planting under any considerations whatsoever.

2. By crawling from an old infested area, more particularly when the supplies of food and breeding material dwindle; this is more applicable where the areas are adjacent. This matter is referred to later.

3. By flying. The information on this mode of migration is extremely scanty. Although it must be taken into serious account in this connection, the degree to which it will influence such rate cannot be determined until our knowledge of the conditions governing flight, the distance over which the beetles can and do travel by such means, and other factors affecting the case are ascertained. From the information to hand on the question generally, it would appear not to be a major factor in the spread of the pest, especially in comparison with its transportation in suckers.

4. By wash down gullies, and steep slopes. Many of our best banana areas are situated well up on the hillsides, and, under the often torrential downpours of rain experienced, infested plant material, and possibly also beetles in the soil, will be carried down from high to low levels.

It has been noted, in some instances where infested material has been washed down in this way into creeks, that it has been carried a considerable distance from its point of origin before becoming stranded with the subsidence of the waters.

This is another reason why old abandoned areas, in such situations especially, constitute so grave a menace to the neighbourhood.

Method of Detection.

The presence of the banana weevil borer at any stage beyond that of the egg, is most readily detected by making an examination of the old butts in the stools, and in stems or old corms lying on the ground. By cutting these open the pest, if present, is evidenced by the tunnels made by the grubs, which will generally be themselves found if the borings are followed up; beetles, or pupæ, may also be met with. Suckers often, though not always, may give an indication, by presenting an unhealthy appearance, particularly noticeable in the leaves; on being removed and cut up, if infested, the tunnels will be seen.

PART 2.

A.—REMEDIAL MEASURES.

Control Measures.

The fallacy of treating the banana weevil borer problem lightly cannot be too strongly emphasised. Those who have paid attention to the toll of this pest realise full well the necessity of taking the most stringent measures to bring it under control. In districts where three or four years ago, and even less, it was not easy to find the pest (and consequently no notice was taken of it) it has now become so prevalent as to give rise to grave anxiety.

In commencing a campaign for combating any pest, the initial work is necessarily that of eliminating, as far as possible, the feeding and breeding grounds. In the case in point, it is not possible, for obvious reasons, to carry out this principle in its entirety and still grow bananas, but there is a great deal that can be done along those lines by cutting up old butts and corms into small pieces, and splitting in halves stems after they have been cut down or fallen out of the stools; in this way natural decay and drying up will be greatly accelerated. They can then be either chipped in or burnt, thus no longer constituting a menace as breeding grounds for the pest.

It is often argued that there is no necessity for destroying this material because the borer does not breed in it; this has not been the writer's experience.

Direct destruction of the pest, however, presents many extremely difficult features. Owing to the whole of the developmental stages of this weevil being passed inside the plant, safely protected from the action of sprays, &c., all such methods of control of insect pests which constitute general economic entomological practice are rendered useless. The introduction of chemicals into the plant to destroy the grubs brings in complications in the risk of affecting both plant and fruit which cannot be lightly disregarded, quite apart from the psychological effect on the mind of the consumer arising out of knowledge that such treatment is being carried out. Very carefully conducted and regulated experiments are required to elucidate this matter; but, unfortunately, suitable facilities for carrying out this and other lines of research have not been available. Facts bearing on this matter will be given later in another connection.

Poison Baits.

Attention has, therefore, had to be concentrated on a combination of the destruction of the beetles, and prevention, or minimisation, of infestation of the plant. In regard to the former, the utility of poisons naturally presents itself as a primary consideration. The work carried out on these lines has already been referred to.

The main points that have to be considered from an economic point of view are—

1. That the poison must be as cheap as possible, and yet be efficient, and that it is readily obtainable in quantity.
2. That it must kill the beetles after feeding on the treated material for a comparatively short time.

Paris Green has so far proved to be the most satisfactory poison for practical purposes, and for field application one part of Paris Green is thoroughly mixed with six parts of flour; this is best done in a large tightly-closed tin. A portion of the mixture can then be transferred to a smaller tin with a finely perforated lid, which can be easily carried around.

The poison mixture is dusted over the freshly-cut surfaces of pieces of corm or cut stem, the former being preferable, which are then laid face down on the bare ground inside, or just outside, the infested stool. They are then covered with a little trash or similar material, thereby not only hindering too rapid a drying of the bait but also rendering the immediate vicinity darker, a condition preferred by the beetles. When a stem is cut down close to the ground a little of this poison mixture dusted over the freshly-cut surface of the butt will also assist in destroying beetles; it is advisable to cover it also with trash.

Utility of Old Butts as Baits.

It has been brought under notice that some growers are boring out a cone in the old bulbs by means of the sucker-pruning blade and dusting in Paris Green, after which the plug is returned to the hole, a pebble being inserted to prevent it falling right in. In one instance in particular good results followed this practice, which was also used when the centre of a sucker bulb was cut out. If this procedure is followed it is advisable to dust the poison around the hole on top of the bulb as well. In some cases wood ashes have been substituted for the flour. Here, however, a note of caution must be sounded, as certain chemicals present in the ash may react with the Paris Green, and render it less effective. Investigations will have to be made to determine the extent to which this is liable to take place, and whether the action is sufficiently great to deleteriously affect the utility of the poison.

Setting out unpoisoned "baits" can be done in a similar manner to that already referred to, but these must be examined at least every other day, and all beetles found on the under surface or in the soil beneath must be collected and destroyed.

Periods for Baiting.

The periods of year when "baiting" will bring about the destruction of the greatest number of beetles are during spring and autumn, and lesser numbers may be destroyed during the summer, or in a mild

winter. Baits require to be renewed about every fortnight, when the old ones should be destroyed. It may be possible at times to cut a slice off the face of the "bait" so as to expose a moister surface which could then be either dusted with the poison mixture or not as desired.

The point has been raised on several occasions that fewer beetles are found under the poisoned than the unpoisoned "baits." This is, in many instances, quite true, but is due apparently to the weevils leaving the former before they die, possibly when the poison begins to take effect. Dead imagines with the green powder on the legs and body have been found as far as 3 feet away from the nearest poison bait, and numbers have been found at a distance of 6 inches or more.

Numbers Caught by Baiting.

Figures obtained in the field of the number of beetles caught in a definite area may be illuminative of what can be done by "baiting" to reduce the beetle population. Unpoisoned baits were used.

1. From slightly less than 2 acres, 30,000 beetles were collected between February and July, 1922; over 5,000 were caught in one round, and one stool yielded a total of 150.

In August of the same year, 1,222 beetles were again caught from this area, and from the 1st to 16th September, 1,472 imagines were destroyed from about half the plantation. The latter total indicates the beginning of the spring increase of beetle activities.

2. From three-quarters of an acre, 4,000 beetles were taken in a few weeks; as many as 800 were collected in one day.

3. From one stool standing close to a heap of old stems, &c., over 300 weevil borers were taken in two months. Many of these must have passed from the rubbish into the stool; this clearly shows what a dangerous practice, not uncommonly met with, it is to stack old corms, &c., in the plantation.

Experiments with Paradichlorobenzene.

As has already been stated, an experimental search for an artifiical attractant has so far proved a failure. If, however, a deterrent could be obtained at a reasonable cost, and in quantity, which would prevent the beetles from approaching the plant to deposit eggs, even for a period, or even minimise this, a very big step forward would be gained. Reference has already been made in this connection to the work being carried on with paradichlorobenzene, the field tests on which have two main objects in view, namely, to ascertain—

1. Whether by burying a fixed dose of the chemical in the bottom of the hole at the time of, or at a period subsequent to the planting the sucker, a protective barrier can be placed around the plant by means of which infestation can be prevented or even minimised.

2. By burying a definite amount of the "dichlor" in or outside an infested stool the beetles can, even to a certain extent, be driven out and prevented totally or in part from returning, and thus at least minimise reinfestation.

If any result is obtained from these tests it will be necessary by further experimentation to determine—

1. How long a single treatment remains effective.
2. How often such must be repeated to obtain the maximum of efficiency.
3. What amount of the chemical is required for each treatment.
4. What are the best period or periods of the year to carry out such treatment.

It is too early yet, however, to form any conclusions, but when sufficient information has been gathered proving conslusively either that it is effective or not, more details can be given on its application, &c.

It can, however, be stated that from the information to hand from growers who have been carrying out the tests, it appears to be yielding very promising results.

There are a number of chemicals and mixtures to be tested in the field from this point of view, but for this work to be done greater facilities are required than are at present obtainable.

Use of Carbon Bisulphide and Potassium Cyanide.

It is often asked why either Carbon bisulphide or Potassium cyanide cannot be used to kill out the banana borer. A brief note on this matter may, perhaps, not be out of place.

Carbon bisulphide has been tested and found to be ineffective. It is, moreover, expensive, dangerous to handle owing to the explosively inflammable nature, when mixed with air, of the vapours given off—even a red hot coal is sufficient to cause ignition; and if great care is not exercised in putting the dose into the soil around the stool the plants may be very seriously affected if not killed.

Potassium cyanide depends, for its killing properties, on the fumes of Hydrocyanic (or Prussic) acid given off when brought in contact with acids. This gas is given off so rapidly, and is so volatile, that unless it is used in a confined gas-proof space it will disperse so quickly that its lethal action is lost. This was the case in tests carried out in the field.

Necessity for Destruction of Uncultivated Plantations.

One of, if not the greatest, factor militating against any effective check on the pest is the absolute apathy shown to the question of the destruction of banana plantations once they are allowed to go out of cultivation. There are many hundreds of acres in Queensland on which banana plants are still existing—it can be called nothing else—producing no fruit worth picking (if any at all), and in which pests are breeding unhampered at an alarming rate.

It is all very well to say that it will not pay to do anything with them. This may be true in one way, but will it pay to breed pests which will spread into the new areas or adjoining plantations? Once the borer becomes established in a plantation it will take a considerable expenditure of time and personal labour, if not of hard cash, to obtain and maintain supremacy over it. If the pest is let go, the life of the productive bearing capacity of the area will be greatly shortened.

Growers who have had a large experience of this pest have stated on a number of ocasions that in an infested plantation, in which measures of control are not undertaken or neglected, the economic bearing capacity will be terminated within two years.

Even if this extreme is not reached in all places, an approximation to it will come, in many of them at least, unless the matter is taken very seriously in hand from the start.

Where stock are available they can be turned into such areas and will soon reduce them to such a condition that there is very little left to destroy. In many deserted plantations to-day the borer, combined with lack of attention, has left barely a plant to a stool, with a few old corms in odd places to be destroyed.

Moreover, such areas as these exercise a fatal fascination over many men as being places from which suckers may generally be obtained for the carting away. But when it is considered that the risk of obtaining a large proportion of infested stock thereby is enormously greater than from even a known infested plantation that is kept in a good state of cultivation, suckers obtained in this way may, and probably will, prove to be dear at a gift.

Cultural Methods.

Where this pest is present in a plantation, all badly-infested stools should be dug out; in lightly-infested ones, old corms should be removed, the stems split in half, and the remainder chopped into small pieces. By this means the fullest use is made of natural decay, and the effect of the sun's heat in drying out the moisture in order to render all this material unsuitable for breeding grounds or harbourage, while larvæ, present in the pieces, are prevented from developing to a stage where they could turn into pupæ.

If the "stems," after removal of the bunches, are left standing in stools in which the borer is present, they will prove a source of prolific breeding-grounds for the pest. For this reason, all such should be cut off as near the ground as possible, and split open as already recommended. Later, when the "followers" have become well established, the old corms should be dug out and treated as above and the hollows filled in with soil.

If cut off a foot or more above the ground, the remains of the "stem," as the tissues decay, form a site greatly favoured by the beetle for sheltering in, hence the reason for cutting them off low down.

Old butts and "stems" removed from the stools and left lying whole on the ground will remain moist for months, and thus aggravate the trouble by increasing the numbers of the pest and providing shelter and feeding sites unless they are either treated as above, or in other ways rendered unsuitable for such purposes.

Poisoning Cut Stems, &c.

Information has recently been received from a grower who has been carrying out a number of field experiments on the control of this pest, that good results have been obtained by poisoning the old "stems" after they have been cut down while lying on the ground; two or more holes are made in the "stem," and a small quantity of a strong solution of

arsenite of soda poured into them. This opens up possibilities of other methods being employed, and would, if consistently successful, obviate the necessity of splitting up this material.

Attention is being paid to experiments carried out by a grower on the treatment of old butts with a soluble poison. Further information has yet to be obtained before it can be definitely decided whether such treatment will render the old (treated) plant material unfit to act as breeding grounds, and yet have no ill-effect on the offshoots or the bunch obtained from them.

In some cases where treatment with a 2 per cent. solution of arsenic has been tried, the effect of the poison on the followers has been very quickly shown, first by a yellowing and wilting of the leaves, often followed by the dying off of the plant.

The greatest care has, therefore, to be taken with the introduction of a poisonous substance into banana plants, the product of which is for human consumption.

Where it is desired merely to kill out the plants completely this method might be used with very good effect, as a strong dose of poison could be used which would probably kill grubs, if not beetles, present in the corms.

Burning.

It must not be thought from any statements made that the burning of old stems, corms, &c., is deprecated, for this is by no means the case. It is fully recognised as the most complete method of destruction possible and is advocated as such. In very many instances, however, the amount of wood necessary for the purpose is not available, and then, further, the objection so often raised to burning is the loss of humus to the soil resulting by this means of disposing of the plant material.

The necessity of keeping a plantation as free as possible of old stems, &c., cannot be too strongly stressed, for it is only by this being thoroughly carried out that the pest can be prevented from increasing at an abnormal rate and that the beetles can be forced to come under the full effect of the poison baits.

B.—PREVENTIVE MEASURES.

Distribution.

As greater attention is paid to this pest, it is being found that the borer is, with but few exceptions, fairly generally distributed throughout the banana-growing districts of Queensland, so that the area from which suckers reasonably free from the risk of infestation can be obtained is limited. It is, of course, most desirable to plant suckers which are absolutely free from infestation, and the only way to do this is to obtain them from an area free from the borer. For various reasons, however, growers more often turn for their requirements to local plantations in which the beetle may be known or suspected to be present.

Precautions in Obtaining Suckers.

To ensure the minimum of risk of carting away infested stock, the following precautions should be followed out as closely as possible:—

1. Only dig one day what can be planted the next.

2. When dug, cut a thin slice off the whole corm as far up as possible without damaging the eye or otherwise impairing its growing qualities. This is to remove as completely as possible any eggs that may have been deposited in it before being dug, and should also reveal the presence of the borer in any infested corms. All bulbs showing the presence of the pest should be discarded and destroyed. All trash should also be removed, as beetles sometimes shelter in the bases of the leaf stalks around the corms.

3. Then put them straight into a cart or slide (or if such cannot be used, a sack); as soon as a load is ready it should be carted right out of the plantation and, if possible, direct to where the bulbs are to be planted. If this is not possible, they should be stacked on a stand well off the ground and at a distance from any banana stools. As the beetles normally move about at night, all suckers or bulbs dug during the day should be carted away before nightfall. Many cases have been met with where plants have been dug, and even pared, but have been left lying on the ground in the plantation, sometimes overnight, or even longer. While they are left in this situation, they are acting as baits, to which the beetles will come to feed, and may, and often do, deposit eggs.

By taking the above precautions this danger is most decidedly considerably lessened, and in instances where this procedure has been followed highly satisfactory results have been obtained.

Many growers prefer to secure butts and plant the eyes. Whenever this is done they should at least be split in halves and examined for borer before being trenched in. All infested butts should be discarded and destroyed.

Before obtaining suckers, it is advisable wherever possible to make a personal examination of the plantation from which they are to be taken, in order to determine whether the place is infested or is apparently free, or if the former, how strong a hold the pest has on the stools.

Although to some it may appear strange, instances have been noted where infested suckers have been dug out and a new one set in the hole from which the old one had been removed, without endeavouring in any way to destroy the beetles that are in the soil in the immediate vicinity. In other cases, planting of suckers has been done in rows in between badly infested standing stools, presumably with the idea of having the new plants in bearing before the old ones were dug out. Either procedure is suicidal; in the former the sucker will be infested in a very short time, and in the latter beetles will soon migrate to the new plants and deposit eggs.

Selection of Site.

In selecting a site for a new plantation, one should never be taken up adjacent to an infested area, unless unavoidably forced to do so. In this latter case, rows of baits should be laid between the old and the new areas, so as to stop as many beetles as possible from crawling in after fresh food. Where old infested and abandoned areas lie alongside, or adjacent to, one or more worked plantations, it is to the grower's own interests to dig such out whenever opportunity offers, or otherwise destroy the stools, and as far as possible the beetles.

It has been stated that if the corms are soaked in water for a number of hours the beetles in them would be killed. From the results obtained by submerging the imagines under water this is evidently a fallacy, more especially when it is realised that the conditions of the tests were the most rigorous it was possible to obtain.

The longevity of the beetles without food has a particular bearing on the question of replanting bananas on land from which infested stools have been dug out. Though it may seem to many that such a condition would not arise, it must not be forgotten that many of the holdings on which this fruit is grown are small in area, and this very question has been raised on a number of occasions. It is evident, from the results obtained in the course of the experiments previously quoted, that provided every portion of banana plant has been dug out, and destroyed at once, six months at least should be allowed to lapse before any replanting is undertaken. Since it is quite possible that under natural conditions the beetles may live longer than has been recorded in confinement, and further that small portions of plant material may easily be left behind on which weevils could subsist for a time, a full year should be allowed from the time of destruction of the material removed before replanting.

It is a common practice to allow a plantation going out of cultivation to become overrun with lantana without first digging out the plants. This is bad policy, for it will take a long while for the stools to die out even when completely overgrown, and during this time the pest, increasing in numbers while the amount of food available is steadily decreasing, will, naturally, spread out further afield. And even after the corms have completely rotted away, a further period will have to be allowed to lapse before the beetles left behind will have succumbed. If the plants are first rooted out and chopped up, by far the greater loss of time will be obviated, and measures can at that time be adopted to at least enormously reduce the weevil population within the area.

PART 3.

Other Insects Mistaken for the Banana Weevil Borer.

There are two other weevils which are commonly mistaken for the one infesting bananas, and a short note together with an illustration may help to point out the differences. They are—

1. The Macrozamia ("Wild pineapple") Borer (*Tranes internatus* Pascoe), and

2. The Sugar-cane Borer (*Rhabdocnemis obscurus*).

1. It is often stated that the banana borer has been found breeding in the butts of the "wild pineapple" plants. This is not correct, however, although grubs may be found in them, together with beetles, that may rather resemble the banana species at a casual glance. In both the grub and the adult stages there are marked differences, even from the layman's point of view, between the two. The grubs of the banana weevil have the middle to hind part of the body very much swollen, whereas those of the Macrozamia species are practically the same thickness throughout their whole length.

The two beetles present several dissimilar features. The body of the former is comparatively slim in proportion to its length, whereas the latter is more squarely built. The former is sluggish and feigns death when disturbed, whereas the latter is very lively and moves away quickly.

The trunk of the 'zamia weevil projects nearly straight down underneath the head, whereas with the banana weevil borer it is projected very decidedly forwards in front of the body.

2. This certainly somewhat resembles the banana weevil, but is slightly larger, and, though dark in colour, is not uniformly jet black, but is a very dark reddish brown, with a dark spot on the outer side of each wing cover and a dark streak on the thorax.

One very marked difference between the banana weevil on the one hand and the cane and 'zamia weevils on the other, which can be readily seen with an ordinary magnifying lens, is that in the first species the ridges on the wing covers are comparatively narrow and the hollow interspaces large, while in the other two the ridges are broad and the interspaces small. The illustration shows diagramatically these external differences between the adults of the three species.

FINAL REMARKS.

It is only by a comparison of observations spread over a long period that any conclusions can be drawn, as it is impossible to obtain an insight into inevitable variations in any other way. Conditions vary so greatly in even succeeding years that divergences must occur in the results of observations made on living matter which is so greatly influenced by such changes. Without this knowledge it is impossible to arrive at any averages, on which alone generalisations can be made. Effective methods of control must embrace all contingencies that may arise over wide variations of local conditions, and yet allow for them wherever necessary.

A variety of unavoidable causes have combined to leave many gaps in the records of observations, lack of facilities and assistance being the greatest contributing factors, and much work yet remains to be done to fill them in. The results to date, however, show that although a considerable amount of investigational work has still to be carried out, both in the laboratory and in the field, it should be more than possible, with concerted action, to control this pest. Future work will, in all probability, show means for improvement upon the present methods employed, and reduce the time and labour that has now to be expended.

The official figures for 1923-1924 gave the total area under banana culture in Queensland as 11,668 acres, yielding 1,953,761 bunches. The value of the fruit alone was approximately £1,000,000 sterling, without taking into consideration the capital invested in the plantations and in trading connected with the industry. There is a large new field reopening in the North to the culture of this fruit, so the industry should attain an even greater value than it has at present to the State.

It is, therefore, obviously a branch of agriculture meriting the greatest consideration and protection, especially as it is a small-holding proposition thus aiding closer settlement.

In conclusion, it is desired to express indebtedness to those growers who have so freely assisted in carrying out experiments and in supplying information on their work and observations. Names and districts have been omitted for obvious reasons.

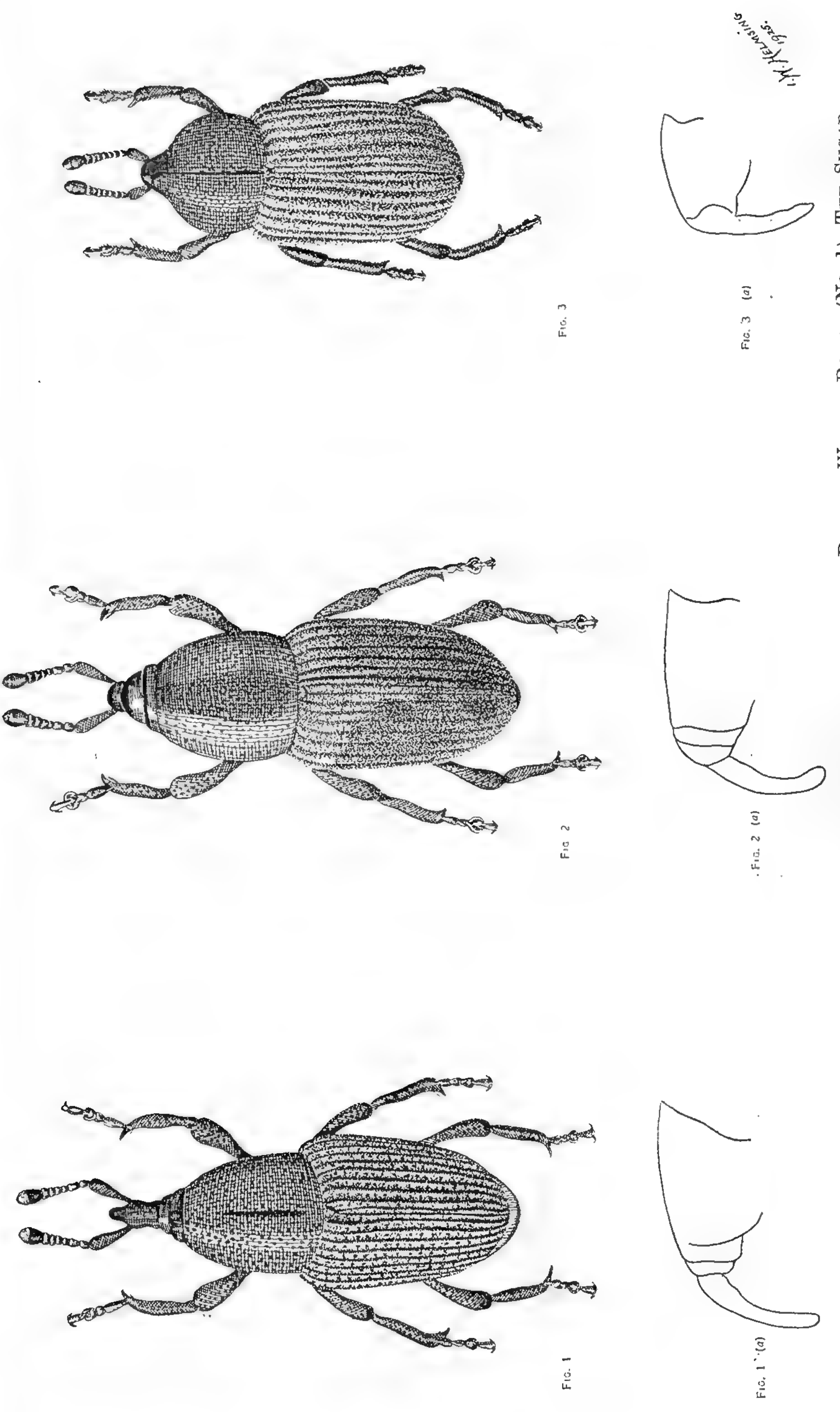


Plate 148.—Showing Diagrammatically the differences between the Banana Weevil Borer (No. 1), The Sugar-cane Weevil Borer (No. 2), and the Macrozamia Weevil Borer (No. 3). Magnified Four Diameters.

LITERATURE AVAILABLE.

F. Muir, Bull. 13, Ento. Series, Hawaiian Sugar Planters' Assocn., Sept., 1916.

F. Jepson, Department of Agriculture, Fiji, 1914: "Mission to Java in Quest of Natural Enemies of *C. Sordidus.*"

W. W. Froggatt, "Black Stem Banana Weevil," "Agric. Gaz., N.S.W.," Nov., 1919.

H. Tryon and A. H. Benson, "Banana Weevil," "Q. Agric. Journal," April and May, 1920.

G. L. Moznette, "Banana Root Borer," "Jour. of Agric. Research," Washington, U.S.A., XIX., No. 1, 1920.

T. McCarthy, "Banana Root Borer," "Agric. Gaz. of N.S.W.," Dec., 1920.

S. M. Cedăna, "Philippine Agriculturalist," X., No. 8, 1922.

H. A. Ballou, "Insect Pests of Plantains and Bananas," "West Indian Bull.," XIX., No. 2, 1922.

"Agric. Circular," Fiji., Vol. 5, No. 1, p. 75.

APPENDIX.

TABLE A.

(FIGURES IN DAYS.)

Eggs Laid.	1921.			1922.			1923.			1924.			1925.		
	Avge.	Max.	Min.	Avge.	Max.	Min.	Avge.	Max.	Min.	Avge.	Max.	Min.	Avge.	Max.	Min.
January ..	No	recor	ds.	5·5	6	4·5	5	5·5	4	No	recor	ds.	No	recor	ds.
February	No	recor	ds.	7	9·5	4·5	No	reco	rds.	No	recor	ds.	No	recor	ds.
March ..	No	recor	ds.	7·5	9	6	No	reco	rds.	8	9·5	7	No	recor	ds.
April ..	No	recor	ds.	10	11	9	11	16·5	10·5	12·5	17·5	10	No	recor	ds.
May ..	No	recor	ds.	29·5	30·5	27	16·5	22	15	21·5	28	16·5	17	23·5	10·5
June ..	19	21·5	14	32	32	..	No	reco	rds.	No	recor	ds.	..	..	..
July ..	27·5	36	20·5	No	reco	rds.	No	reco	rds.	No	recor	ds.	..	..	..
August ..	25·5	33	19·5	No	reco	rds.	No	reco	rds.	No	recor	ds.	..	..	..
September	13	18	10	17·5	22·5	14·5	16	21·5	13·5	15	18	13	..	..	..
October ..	11·5	15	9	10	12	8·5	9	12	8	10	13·5	7·5	..	..	..
November	7·5	8	6·5	7	8	6·5	7·5	8·5	7	8	9	7	..	..	..
December	7	9	5·5	6·5	8	5·5	6·5	7	6	8	9	7·5	..	..	..

NOTE.—The figures given in this table cover a far wider range of observations than those given in Table B.

TABLE B.

(AVERAGES IN DAYS.)

Eggs Laid.	Egg Period.			Larval Period.			Pupal Period.			Life Cycle.		
	Avge.	Max.	Min.	Avge.	Max.	Min.	Avge.	Max.	Min.	Avge.	Max.	Min.
1922.												
September ..	16	19·5	11	41·5	48·5	36	7	9·5	6	65·5	72·5	57·5
October ..	9·5	12	7·5	43	59	36·5	7	8·5	5·5	58·5	72·5	47
November ..	5·5	8·5	4·5	44·5	46·5	30	7	8·5	5·5	56·5	57·5	42·5
December ..	7	8·5	6	33	41	24·5	7	8·5	6·5	46·5	54	36
1923.												
May ..	17	18	16·5	126	131·5	117	15	21	10	156·5	162	151·5
September ..	17·5	18	15	40·5	43	38·5	9	10·5	8	65·5	69	64
October ..	11·5	14	6	37·5	49·5	25·5	8	9	7	51·5	66·5	41
November ..	7·5	13	4·5	36·5	47·5	21·5	7	9	5·5	54	60	34·5
1924.												
March ..	6·5	7·5	6	123·5	165·5	50	15	22	9·5	177·5	180	79·5
April ..	11	17	8	136·5	147·5	126·5	11·5	12	11	161	167·5	155
May ..	18·5	22·5	14·5	117·5	130	105·5	9·5	12	7	137·5	139	136
September ..	15	22·5	13	45	83	38·5	9	11·5	6·5	68	114	59
October ..	9	11·5	4·5	40·5	51	30	7	14·5	5	53	68	40·5
November ..	8	12·5	5·5	39	63·5	16·5	8	11	4	52	82	29
December ..	4·5	7	2	19	24	14	9·5	14	5	33	36	30
1925.												
April (one observa)tion	14	..	..	41·5	45	38	16	..	..	65	72	58

NOTE.—The egg periods in this table refer only to those cases in which the life-cycle was completed.

TABLE C.

Eggs Laid.	Prepupal Period in Days.	Occurring in—
1922—		
September	2–3	November
October	2–3	December
November	1–3	December–January, 1923
December	1–2	January, 1923
1923—		
May	3–5	October
September	1–2	November
October	1–2	November
November	1–3	December
1924—		
March	3–4	May–August
April	3–4	September
September	1–2	October–November
October	1	November–December
November	1–2	January, 1925
1925	3–4	June

TABLE D.

Collected.	Life in Days (Average).	Life in Terms of— Lunar Months.	Weeks.	Days.	Maximum in Days.	Minimum in Days.
1921—						
January ..	409	14	2	3	413	406
February ..	411	14	2	5	450	372
April	396	14	0	4	400	392
May	466	16	2	4	482	453
June	480	17	0	0	482	478
July	448	16	0	0	449	445
August ..	426	15	0	6	428	424
September ..	334	11	3	5	347	320
1922—						
February ..	334	11	3	5	381	287
March	177	6	1	2	181	172
May	200	7	0	4	203	198
July	384	13	2	6	391	376
August ..	384	13	2	6	391	377
September ..	376	13	1	5	392	370
October ..	295	10	2	1	301	273
November ..	310	11	0	2	313	306
1923—						
April	265	9	1	6	270	259
July	196	7	0	0	210	190
September ..	306	10	3	5	314	298
October ..	144	5	0	4	147	141
November ..	94	3	1	3	96	91
1924—						
January ..	409	14	2	3	428	350
March	361	12	3	4	369	353
April	311	11	0	4	317	306
June	264	9	1	5	272	261
July	244	8	2	6	253	236
August ..	203	7	1	0	205	199
September ..	185	6	2	3	194	176
October ..	154	5	2	0	166	143
November ..	128	4	2	2	137	120
December ..	93	3	1	1	98	88

TABLE E.

Bred.	Life in Days.	Life in Terms of— Lunar Months.	Weeks.	Days.	Maximum in Days.	Minimum in Days.
1921—						
April	480	17	0	4	488	471
June	367	13	0	3	368	365
October	144	5	0	4	153	134
November	235	8	1	4	343	126
December	198	7	0	2	210	186
1922—						
January	132	4	2	6	133	130
October	19	0	2	5	33	12
November	72	2	2	2	458	3
December	178	6	1	3	748	4
1923—						
January	21	0	3	0	52	1
October	22	0	3	1	34	7
November	10	0	1	3	15	6
December	26	0	3	5	73	5
1924—						
January	5	0	0	5	7	3
March	103	3	2	5	108	99
September	25	0	3	4	50	12
November	63	2	1	0	145	1
December	*87	3	0	3	Over 186*	6
1925—						
January	22	0	3	1	105	1

* Incomplete.

TABLE F.

Date Started.	Number of Beetles taken in each Lot.	Time run to death of last Beetle in Dry Soil.	Time run to death of last Beetle in Damp Soil.	Percentage of Control Alive at end of Test.
10th April, 1923	20	4–6	104–106	5
22nd May, 1923	20	4–6	120–121	30
24th August, 1923	20	6–7	81–89	0
19th September, 1923	20	5–6	52–55*	5*
4th October, 1923	20	4–6	66–69	15
18th October, 1923	20	9–11	94–106	5
15th November, 1923	20	Under 6	99–105	0
8th December, 1923	20	4–5	45–51	15
22nd March, 1924	20	5–6	112–119	95
7th May, 1924	20	6–8	178–185	55
19th July, 1924	20	6–12	112–128	55
2nd September, 1924	20	4–7	50–66	60
5th November, 1924	20	..	35–41	55
24th November, 1924	20	..	28	40

* Series interfered with and not completed. 20 per cent. alive in damp soil.

TABLE G.

Eggs Laid.	Imagines Emerged.	Eggs Laid.	Oviposition to Oviposition in Days.	Emergence to Oviposition in Days.
..	24–27/4/21	11–13/7/21	..	75–80
8/6/21–1/7/21	11–27/10/21	14–17/11/21	136–161	28–47
22/9/21–5/10/21	15–24/11/21	18–19/1/22	105–118	55–65
5–8/10/21	25–28/11/21	25–27/1/22	109–114	59–64
22/9/21–5/10/21	2–9/12/21	23–25/1/22	110–124	45–54
18/10/21–4/11/21	2–12/12/21	18–19/1/22	75–92	37–48
5–18/10/21	1–12/12/21	7–10/3/22	140–156	85–99
1–13/3/22	16–20/4/22	20/5/22–2/6/22	68–83	30–47
18–22/9/22	1–4/12/22	6–9/1/23	106–113	33–36
12–16/10/22	1–4/12/22	6–9/1/23	82–89	33–36

TABLE H.

Poison.	How Used.	Dilution.	Period of Year Tested.	Exposure to Poison in Hours.	Percentage Killed.	Control percentage Alive.
Barium Chloride	In solution ..	5 per cent. ..	Nov. ..	18–48	2	100
	ditto ..	2 per cent. ..	Nov. ..	18–48	6	100
	ditto ..	1 per cent. ..	Nov. ..	18–48	1	100
Mercuric Chloride	ditto ..	·1 per cent. ..	Nov. ..	18–48	2·5	100
	ditto ..	·06 per cent. ..	Nov. ..	18–48	2·5	100
	ditto ..	·05 per cent. ..	Nov. ..	18–48	2	100
Sodium Arsenite	ditto ..	2 per cent. ..	Oct. ..	18–48	10·5	100
	ditto ..	1 per cent. ..	Oct. ..	18–48	1·5	100
	ditto ..	·5 per cent. ..	Oct. ..	18–48	2	100
	Powder ..	1 to 3 ..	June ..	18–54	92·5	100
	ditto ..	1 to 3 ..	Sept. ..	18–42	100	100
	ditto ..	1 to 6 ..	Sept. ..	18–42	98	100
	ditto ..	1 to 3 ..	Sept. ..	3–24	74·4	100
	ditto ..	1 to 6 ..	Sept. ..	3–24	69·4	90
Arsenic Trioxide	ditto ..	1 to 3 ..	Oct. ..	18–72	88·1	90
Borax	ditto ..	1 to 3 ..	June ..	18–60	80	100
	ditto ..	Pure ..	July ..	18–58	85	90
	ditto ..	Pure ..	Sept. ..	18–66	94·4	100
	ditto ..	Pure ..	Nov. ..	3–24	43·8	90
	ditto ..	Pure ..	Sept. ..	18–48	95	100
Calcium Arsenate	ditto ..	Pure ..	April ..	18–48	71·3	100
	ditto ..	1 to 6 ..	April ..	19–48	63·1	100
Lead Arsenate	ditto ..	1 to 6 ..	May ..	19–92	20	100
Paris Green	ditto ..	Pure ..	Feb. ..	18–48	99·4	100
	ditto ..	1 to 6 ..	March ..	18–48	96·9	100
	ditto ..	1 to 6 ..	March ..	3–24	97·5	80
	ditto ..	1 to 6 ..	April ..	½–3	56·9	90
	Suspension in weak flour paste	..	Feb. ..	18–48	80·6	100
Barium Sulphate	Powder ..	1 to 6 ..	Jan. ..	18–48	14·4	100
Copper Resinate	ditto ..	1 to 6 ..	April ..	18–48	2·5	100
Copper Sulphate	ditto ..	2 to 3 ..	May ..	18–48	2·5	100
Sodium Acetate	Solution ..	Concentrated	Dec. ..	18–66	27·8	100
Sodium Arsenite and Arsenic Trioxide (1 : 1)	Powder ..	1 of mixture to 3 of flour	March to April	3–7 24–27	75 87·6	100
Sodium Arsenite and Paris Green (1 : 1)	ditto ..	ditto ..	March to April	3–7 24–27	72·5 100	100
Sodium Arsenite and Borax (equal parts)	ditto ..	2 of mixture to 3 of flour	April ..	3–5 24–28	55 95	100
Paris Green and Borax (equal parts)	ditto ..	ditto ..	April ..	3–5 24–28	95 100	100
Calcium Arsenate and Paris Green (2 : 1)	ditto ..	1 of mixture to 3 of flour	Oct. ..	5–7 24–48	65 90	70
Calcium Arsenate and Sodium Arsenite (2 : 1)	ditto ..	ditto ..	Oct. ..	5–7 24–48	90 95	80

EGG-LAYING COMPETITIONS.

MOUNT GRAVATT.

In October two deaths occurred in Section 2, and broodiness was also prevalent. Eggs laid numbered 5,669, an average of 21 eggs per bird. Individual scores :—

SECTION 1.

White Leghorns.

Competitor.	A.	B.	C.	D.	E.	F.	Total.
W. E. Woodward	134	155	158	137	158	133	875
John J. McLachlan	141	156	150	135	158	116	856
Eclipse Poultry Farm	161	151	125	144	139	121	841
E. J. Stilton	139	141	136	158	154	100	828
S. L. Grenier	162	154	161	93	122	124	816
M. F. Marsden	129	145	131	122	139	148	814
B. Driver	151	123	98	138	144	152	806
R. C. J. Turner	139	128	138	150	111	133	799
W. Wakefield	146	154	119	138	127	95	779
Geo. Marks	106	149	122	119	155	122	773
N. F. Newberry	101	130	156	139	120	112	758
J. Harrington	94	127	95	157	134	148	755
I. W. Cox	97	114	149	143	129	111	743
T. H. Craig	105	142	119	126	119	130	741
J. E. G. Parnell	132	102	126	150	113	96	719
Chris. A. Goos	150	95	109	131	98	128	711
Mrs. Clarke	98	145	123	115	139	89	709
A. S. Walters	129	117	103	118	77	138	682
T. W. Honeywell	110	2	139	123	123	110	607
W. D. Melrose	149	122	53	15	129	15	483

SECTION 2.

Black Orpingtons (except where stated).

Competitor.	A.	B.	C.	D.	E.	F.	Total.
E. Ward	152	137	143	133	142	126	833
Jas. Potter	154	132	129	125	134	131	805
W. and G. W. Hindes	168	107	110	97	131	155	768
G. E. Rodgers	131	148	145	111	146	86	767
Carinya Poultry Farm	141	143	90	103	145	126	748
R. Burns	133	103	121	129	115	96	697
J. Pryde (R. I. Reds)	120	117	89	142	101	124	693
Thos. Hindley	164	80	139	85	122	94	684
C. Dennis	123	115	147	131	54	89	659
A. E. Walters	60	77	121	117	132	110	617
J. Hutton	130	118	83	66	60	114	571

The following are the scores of pens which failed to obtain the average weight of 24 ounces to the dozen.

SECTION 1.

W. and G. W. Hindes	161	156	154	166	166	175	978
Mrs. R. E. Hodge	146	148	137	165	125	141	862
Mrs. C. E. Lindley	123	101	100	150	129	126	729
H. Fraser	94	147	150	152	144	119	806
Jas. Hutton	141	120	161	108	114	128	772
Jas. Earl	139	145	102	145	124	143	798
H. P. Clarke	118	146	109	126	114	146	759
L. Bird	136	102	115	111	164	114	742
E. Anderson	73	109	115	113	141	154	705

SECTION 2.

Eclipse Poultry Farm	154	134	149	164	131	159	891
H. Cutcliffe	153	137	146	133	157	152	878
Mrs. A. E. Gallagher	142	134	152	116	137	164	845
E. C. Stead	50	72	95	82	86	88	473

N.U.P.B.A. TOOWOOMBA SUB-BRANCH.

Single Test Egg-laying Competition—Scores to 31st October, 1925.

White Leghorns.

Pen No.	Name.	Oct.	Total.	Pen No.	Name.	Oct.	Total.
42	D. H. Dipple ..	27	158	62	Jas. Goggins ..	21	98
52	R. B. Howard ..	24	156	20	H. Dibbs	22	97
41	D. H. Dipple ..	27	152	46	M. J. Frawley ..	15	95
39	R. C. Cole	26	151	37	P. J. Fallon ..	20	92
8	H. S. Wagner ..	21	142	10	A. C. Horne ..	23	91
21	G. E. Rogers ..	25	139	13	J. E. King	20	90
50	C. A. Keen	20	136	25	W. G. Harper ..	21	90
40	R. C. Cole	20	136	45	M. J. Frawley ..	18	89
9	A. C. Horne ..	17	135	5	G. Maurer	21	86
33	H. J. Manning ..	21	134	17	W. D. Williams ..	6	83
27	J. W. Short	22	127	6	G. Maurer	22	83
28	J. W. Short	22	127	4	E. Parker	20	81
29	J. H. Jones	17	127	12	Jas. Hutton ..	18	76
32	J. Newport	19	125	44	S. B. V. Sharkey ..	5	68
30	J. H. Jones	24	124	55	J. F. Dahlheimer ..	13	66
54	E. W. Howe ..	25	124	22	G. E. Rogers ..	—	60
11	Jas. Hutton ..	22	122	43	S. B. V. Sharkey ..	13	35
26	W. G. Harper ..	26	121	53	E. W. Howe ..	*23	142
19	H. Dibbs	19	121	57	S. Chapman	*20	133
49	C. A. Keen	19	120	14	J. E. King	*18	122
60	M. Murphy	21	116	58	S. Chapman	*20	121
35	R. C. J. Turner ..	23	114	7	H. S. Wagner ..	*18	120
51	R. B. Howard ..	20	113	23	Everlay P. Farm ..	*19	120
38	P. J. Fallon	15	112	24	Everlay P. Farm ..	*19	94
2	Jas. Taylor	20	107	36	R. C. J. Turner ..	*18	87
48	G. Stilton	23	106	15	W. Grant	*15	84
61	Jas. Goggins ..	20	106	16	W. Grant	*13	81
56	J. F. Dahlheimer ..	17	105	47	G. Stilton	*17	67
3	E. Parker	18	102	18	W. D. Williams ..	*20	65
1	Jas. Taylor	18	101	34	H. J. Manning ..	*20	64
59	M. Murphy	20	100	31	J. Newport	*19	54

Other Varieties.

71	H. Dibbs (Lang.) ..	26	147	81	V. Brand (B.L.) ..	10	59
75	W. G. Badcock (R.I.R.)	20	123	80	Everlay P. Farm (W. W'dotte) ..	*24	127
64	S. Chapman (B.L.)	10	105	77	L. Maund (Col. W'dotte)	*23	116
65	Mrs. K. O'Connor (B.L.)	20	105	66	Mrs. K. O'Connor (B.L.)	*24	115
69	W. G. Badcock (Lang.)	13	94	82	V. Brand (B.L.) ..	*13	111
73	A. W. Le Pla (R.I.R.)	7	89	79	Everlay P. Farm (W. W'dotte) ..	*15	90
68	E. Parker (B.L.) ..	15	85	76	W. G. Badcock (R.I.R.)	*12	75
72	H. Dibbs (Lang.) ..	21	81	63	S. Chapman (B.L.) ..	*5	74
70	W. G. Badcock (Lang.)	15	71	78	L. Maund (Col. W'dotte) ..	*—	59
74	A. W. Le Pla (R.I.R.)	18	66				
67	E. Parker (B.L.) ..	11	61				

Black Orpingtons.

117	T. Hindley	24	154	128	J. W. Short	16	137
89	A. W. Le Pla ..	20	152	105	L. Maund	13	137
120	Jas. Hutton	16	151	121	E. W. Brock ..	11	133
99	A. R. Petty	18	151	106	L. Maund	21	133
132	G. E. Rogers ..	19	147	96	R. Burns	21	131
119	Jas. Hutton	21	144	118	T. Hindley	26	130

* Signifies bird laying under-weight eggs.

N.U.P.B.A. TOOWOOMBA SUB-BRANCH—*continued.*

Black Orpingtons—*continued.*

Pen No.	Name.	Sept.	Total.	Pen No.	Name.	Sept.	Total.
107	C. Graham	16	128	115	Everlay P. Farm ..	18	81
126	H. B. Stephens ..	23	120	122	E. W. Brock ..	22	80
114	D. W. Williams ..	17	120	110	S. McBean	14	72
97	V. J. Rye	13	120	95	R. Burns (dead) ..	—	71
98	V. J. Rye	19	116	123	P. Hopkins	—	70
100	A. R. Petty	11	116	125	H. B. Stephens ..	7	51
88	J. Head	20	115	87	J. Head	0	46
111	E. Walters	14	115	131	G. E. Rogers (re-placed)	22	27
90	A. W. Le Pla ..	21	114	130	R. Neil	*14	158
86	—. Kelly	21	107	127	J. W. Short	*26	151
109	S. McBean	13	104	116	Everlay P. Farm ..	*21	140
83	W. R. Wilson ..	26	101	94	T. C. Ollier	*21	94
108	C. Graham	17	100	124	P. Hopkins	*3	93
102	T. J. Carr	14	99	91	K. Macfarlane ..	*17	87
113	D. W. Williams ..	16	91	104	W. S. Adams ..	*17	81
92	K. Macfarlane ..	22	89	101	T. J. Carr	*25	76
84	W. R. Wilson ..	13	89	129	R. Neil (dead) ..	*10	74
85	—. Kelly	3	88	93	T. C. Ollier (re-placed)	*20	67
112	E. Walters	7	87				
103	W. S. Adams ..	14	86				

* Signifies bird laying under-weight eggs.

JOSEPH GARNER, Government Supervisor.

N.U.P.B.A., ZILLMERE.

The White Leghorn section averaged 21.8 eggs per bird for October, but the other sections have not been laying so well. Black Orpingtons produced 17.3, and other varieties 15.5 eggs each. The average for the whole competition was 20 eggs. Two deaths occurred—No. 93 White Leghorn and No. 158 Langshan.

White Leghorns.

Pen No.	Name.	Oct.	Total.	Pen No.	Name.	Oct.	Total.
82	G. W. Cox	25	182	13	R. C. J. Turner ..	24	132
35	S. L. Grenier ..	24	175	67	W. H. Forsyth ..	16	131
8	R. C. Cole	24	174	50	F. J. Williams ..	23	130
27	J. J. McLachlan ..	27	173	33	W. E. Woodward ..	24	129
95	S. A. Doman ..	24	170	29	M. F. Newberry ..	29	126
86	H. T. Pember ..	19	165	41	S. A. Chapman ..	23	126
81	R. Marshall ..	22	164	12	J. Fordyce ..	26	125
39	R. Duff	21	154	47	G. E. Rogers ..	20	125
85	H. T. Pember ..	20	151	18	J. T. Webster ..	24	123
36	S. L. Grenier ..	25	150	70	S. Lloyd	20	121
65	A. S. Walters ..	22	149	40	S. A. Chapman ..	19	120
79	R. Marshall ..	21	149	11	J. Fordyce ..	18	119
15	R. C. J. Turner ..	20	146	84	G. W. Cox	12	118
43	J. R. Wilson ..	24	146	99	A. Anderson ..	12	117
59	J. Hutton	25	146	3	J. Earl	28	116
45	J. R. Wilson ..	23	145	52	E. C. Raymond ..	22	116
14	R. C. J. Turner ..	25	144	22	H. Pearce	22	115
83	G. W. Cox	25	144	89	R. H. Woodcock ..	24	114
19	J. L. Chapman ..	21	143	1	J. Earl	22	112
96	S. A. Doman ..	29	143	62	W. Wakefield ..	24	111
51	F. J. Williams ..	25	142	61	W. Wakefield ..	21	110
92	C. Quesnell ..	17	142	48	G. E. Rogers ..	20	109
6	W. J. Berry ..	25	141	38	R. Duff	19	108
78	A. Hodge	19	141	77	A. Hodge	18	108
23	H. Pearce	28	138	58	J. Hutton	26	107
53	E. C. Raymond ..	22	138	75	J. E. G. Purnell ..	23	107
17	J. T. Webster ..	17	137	80	R. Marshall ..	22	107
10	J. Fordyce ..	20	136	69	W. H. Forsyth ..	20	104
42	S. A. Chapman ..	22	136	98	A. Anderson ..	21	103
16	J. T. Webster ..	24	135				

N.U.P.B.A. ZILLMERE—*continued.*

White Leghorns—*continued.*

Pen No.	Name.	Oct.	Total.
34	S. L. Grenier (replaced 14-4-25)	29	102
28	M. F. Newberry ..	22	101
21	J. L. Chapman ..	10	100
2	J. Earl	23	98
7	R. C. Cole	22	98
71	S. Lloyd	21	97
20	J. L. Chapman ..	19	94
54	E. C. Raymond ..	19	89
24	H. Pearce	4	85
72	S. Lloyd	23	75
49	F. J. Williams ..	17	75
91	C. Quesnell ..	16	74
97	A. Anderson (replaced 26-6-25)	20	71
37	R. Duff (replaced 18-8-25) ..	24	52
73	J. E. G. Purnell (replaced 14-9-25)	23	34
25	J. J. McLachlan ..	23	U189
31	W. E. Woodward..	26	U183
87	H. T. Pember ..	23	U183
26	J. J. McLachlan ..	25	U182
30	M. F. Newberry ..	26	U181
64	A. S. Walters ..	21	U176
44	J. R. Wilson ..	25	U170
46	G. E. Rogers ..	25	U163
66	A. S. Walters ..	21	U163
60	J. Hutton	23	U159
90	R. H. Woodcock ..	22	U156
57	J. P. Marshman ..	24	U150
55	J. P. Marshman ..	25	U140
9	R. C. Cole	17	U139
32	W. E. Woodward..	24	U137
88	R. H. Woodcock ..	25	U137
68	W. H. Forsyth ..	27	U135
74	J. E. G. Purnell ..	28	U132
4	W. J. Berry ..	20	U128
76	A. Hodge	8	U126
94	S. A. Doman ..	6	U124
63	W. Wakefield ..	24	U104

Black Orpingtons.

Pen No.	Name.	Oct.	Total.
124	H. M. Chaille ..	27	180
110	G. E. Rogers ..	22	176
148	J. Potter	26	175
102	J. Hutton	18	172
139	T. Hindley ..	23	172
122	W. H. West ..	15	171
125	H. M. Chaille ..	19	171
140	T. Hindley ..	17	169
103	C. C. Dennis ..	19	168
143	J. Pryde	23	164
128	E. C. Raymond ..	21	156
101	J. Hutton	24	153
138	W. D. Melrose ..	7	150
109	G. E. Rogers ..	16	147
142	J. Pryde	23	137
144	J. Pryde	17	136
132	T. C. Ollier ..	18	131
126	H. M. Chaille ..	16	130
100	J. Hutton	11	125
149	J. Potter	16	123
147	E. Walters ..	7	121
112	W. R. Wilson ..	27	118
141	T. Hindley ..	16	118
113	W. R. Wilson ..	24	109
135	R. Burns	20	107
134	R. Burns	16	102
127	E. C. Raymond ..	17	100
133	R. Burns (replaced 25-4-25) ..	15	99
104	C. C. Dennis ..	19	97
121	W. H. West ..	0	23
146	E. Walters ..	19	U168
130	T. C. Ollier ..	17	U164
108	W. H. Forsyth ..	18	U159
107	W. H. Forsyth ..	21	U152
131	T. C. Ollier ..	14	U149
150	J. Potter	13	U146
111	G. E. Rogers ..	22	U139
123	W. H. West ..	22	U135
105	C. C. Dennis ..	17	U125
106	W. H. Forsyth ..	19	U112
114	W. R. Wilson ..	27	U107
137	W. D. Melrose ..	3	U61
136	W. D. Melrose ..	1	U43
129	E. C. Raymond ..	0	U29

Other Varieties.

Pen No.	Name.	Oct.	Total.
118	Mrs. J. Pryde (R.I.R.) ..	16	156
155	W. L. Howard (W.W.) ..	17	135
151	W. H. Forsyth (S.W.) ..	20	134
152	W. H. Forsyth (S.W.) ..	17	131
157	J. Pryde (Lang.)..	23	129
166	A. S. Keith (Ancona) ..	13	121
120	Mrs. J. Pryde (R.I.R.) ..	14	115
167	A. S. Keith (Ancona) ..	21	115
164	J. L. Hill (B.L.)..	20	106
119	Mrs. J. Pryde (R.I.R.) ..	7	105
159	J. Pryde (Lang.)..	15	105
153	W. H. Forsyth (S.W.) ..	0	92
160	W. and G. W. Hindes (B.L.)	29	U139
154	W. L. Howard (W.W.) ..	18	U136
156	W. L. Howard (W.W.) ..	11	U123
161	W. and G. W. Hindes (B.L.)	17	U122
162	W. and G. W. Hindes (B.L.)	19	U103
168	A. S. Keith (Ancona) ..	0	U63

"U" indicates eggs under 2 oz.

C. Kidd, Hon. Secretary.

OBSERVATIONS ON THE PLANTS OF CHARLEVILLE.

CHARACTERISTICS OF THE WESTERN FLORA.

By W. D. FRANCIS, Assistant Government Botanist.

As Charleville is situated about 360 miles from the sea, one expects to find that its flora is different from that of the coast because of the dissimilar conditions prevailing in the two regions. The native coastal species with a very few exceptions do not extend so far inland. Only a few species such as some common grasses and the Moreton Bay Ash (*Eucalyptus tesselaris*) are common to both areas. The vegetation of Charleville and of similar western areas impresses one with its general grey appearance, its comparatively small number of species, and the predominance of one or a few species of plants over fairly large areas. The occurrence in places of forests composed almost exclusively of coolibar, cypress pine, gidgee, box, or mulga supplies instances of tracts of vegetation in western areas composed of one or a few kinds of plants. The dense rain forests of parts of coastal Queensland form a strong contrast to these western plant associations in many repects. In the rain forests vegetation is represented by numerous forms, growth is luxuriant, species are very numerous, in place of the relative simplicity of the western flora there is complexity or even confusion in the constitution of the plant communities, and it is seldom possible to find areas in which one species greatly predominates over all others.

Influence of Rainfall.

A very large number of the pecularities of the western flora is obviously due to the rainfall. Of all the natural factors by which plants are affected and by which plant distribution is controlled, the supply of water is probably the most fundamental. This is consistent with what is known of the constitution of living matter as water is the medium in which many of its elements and compounds are dissolved or suspended. In addition, water is generally by far the most abundant constituent of plants.

The average annual rainfall of Charleville is about 20 inches. The heavy rain forests of the coast are situated in areas in which there is an average precipitation of 50 inches or more per year.

The grey appearance of the foliage of many western plants is due either to a clothing of fine, silvery hairs or a grey, wax-like scurf or powder. The pale colour of the mulga (*Acacia aneura*) and of the galvanised burr (*Bassia Birchii*) is due to their clothing of fine, whitish hairs. A partial covering of grey scurf or powder gives the cypress pine (*Callitris glauca*), the gidgee (*Acacia Cambagei*), the silver-leaved ironbark (*Eucalyptus melanophloia*), and the sandalwood (*Santalum lanceolatum*) their grey appearance. A resinous covering on the leaves and young twigs is another feature of several western plants. This peculiarity is possessed by one of the native fuchsias (*Eremophila Goodwinii*), which is very common in the Charleville district, and by the western sandalwood (*Eremophila Mitchellii*).

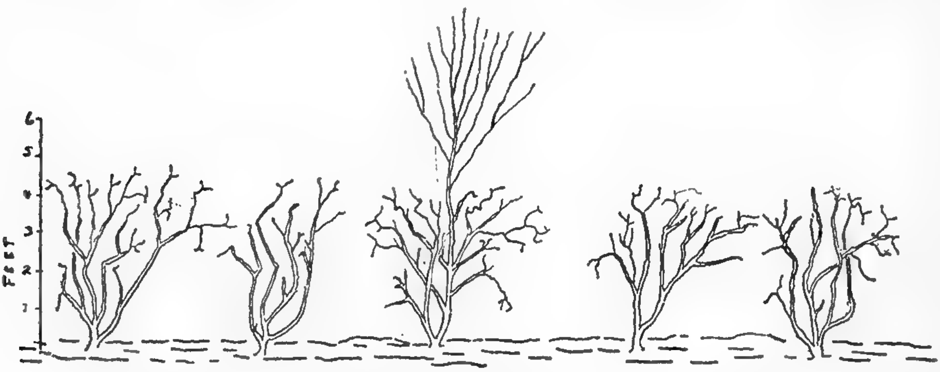


Diagram showing the stunted and distorted forms assumed by Mulga (*Acacia aneura*) as a result of trimming by stock. The tree in the middle has been fed down in the earlier part of the growth but has assumed its normal shape in its upper part owing to the development of a shoot situated towards the middle of the tree which has apparently been inaccessible to stock.

The three kinds of vestiture, described as so frequent on the foliage of many western plants, are regarded by those who have made a special study of plants in relationship to their environment as a protective measure against the rapid evaporation of the water contained in the tissues of plants in dry areas. In other parts of the world it has been observed that the coating of hairs on the same species becomes more dense as the location of the species passes into drier areas. A Queensland example of this kind was noted quite recently in the case of *Trichosdesma zeylanicanum*, specimens from Boulia in the far west being much more hairy than those from Charters Towers in the east.

The relative simplicity of the western flora can also be attributed to a great extent to the low rainfall. The restricted natural supply of water fixes a narrow limit to the number of perennials which can survive for lengthened periods in a climate characterised by a high evaporation factor. Consequently only plants which are specially adapted to prevent the evaporation of the water in their tissues, which is essential to their existence, are to be found in such areas. The distribution of the species into plant associations which are often well defined is also partly explicable, as the number of species, already strictly limited by the supply of water, is subject to the further restrictive influence exerted by the composition of the soil.

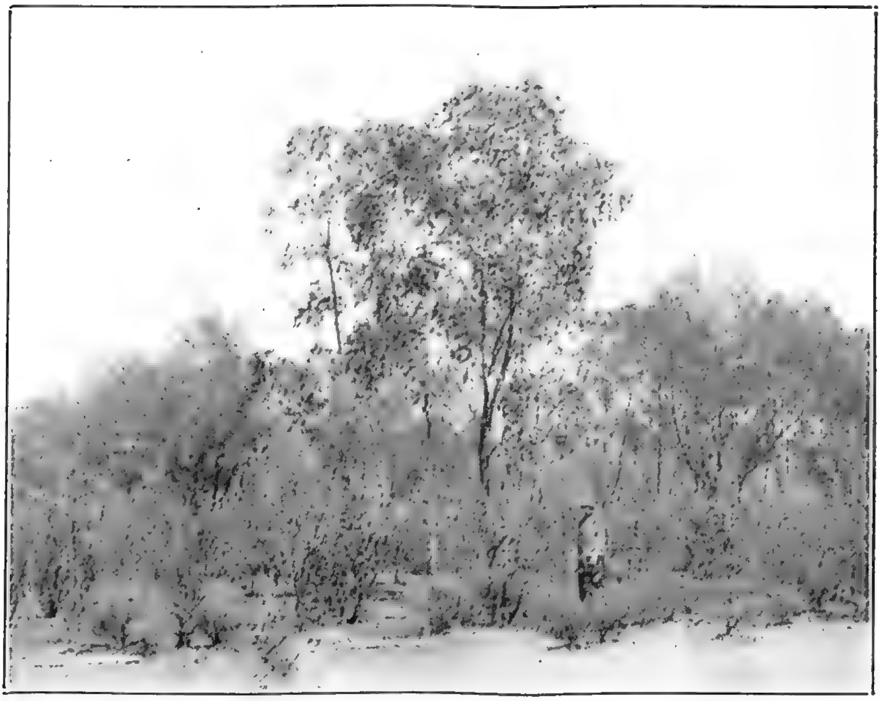


Photo.: W. D. Francis.

PLATE 149.

Mulga (*Acacia aneura*) scrub, Charleville. Poplar box (*Eucalyptus populifolia*) trees in middle of picture. The low undershrubs in the foreground are a species of native fuchsia (*Eremophila Goodwinii*). Extending across the picture from left to right near the figure is an area of mulga eaten down by stock to a height of 4 to 6 feet. Mulga trees in background left and right of the poplar boxes.

Modification of the Mulga by Stock.

Mulga is a western Acacia (*Acacia aneura*). When not eaten down it is a small tree with erect or ascending branches. The great fondness of stock for the leaves and young twigs of this tree is strikingly evident in an area southwards from the town of Charleville where there are many acres of the trees closely eaten back. The sight of acres of mulga trimmed to a regular height of from 4 to 6 feet is a remarkable presentation of vegetation modified in form by browsing stock. The diagram shows that where stock have access to them the stems and branches are

very irregular, angular, and frequently ramified. These distortions are due to the arrested growth of terminal shoots which are eaten by stock. Lateral shoots then emerge and in their turn are eaten off, and these are followed by the development and subsequent trimming of other lateral shoots. Occasionally, however, a shoot towards the middle of a spreading, trimmed tree escapes being eaten, apparently on account of its inaccessibility, and the normal development of the tree ensues as shown in the diagram and one of the photographs.

Suspected Poisonous Plants Trimmed by Stock.

In some of the mulga scrubs it was noticed that one of the native fuchsias (*Eremophila Goodwinii*), which is very abundant in much of the country around Charleville, was eaten off a fair amount. This shows that stock do not always avoid this plant, which has a poisonous reputation. Probably the poisonous principle becomes evident when hungry stock feed upon it, as suggested by Mr. Cardell, the local Stock Inspector. Another suggested poisonous plant, *Myoporum acuminatum*, which belongs to the same natural order (Myoporineæ) as the native fuchsias was found to be trimmed off to a large extent. The shrubs of this species are plentiful on the sandy area near the town known as "The Sandhills."

Brittleness of Some Western Trees.

While collecting specimens during a recent visit to Wallumbilla and Charleville, the writer noticed that the twigs of many of the trees and shrubs of these areas were very brittle. The twigs of *Heterodendron oleæfolium* are typical examples of this kind. It is interesting to find that a similar peculiarity has been noticed in other parts of the world, as Warming (Oecology of Plants 127, 1909) states that the wood of plants in a dry climate is frequently dense and hard and often brittle. Another case of the brittleness of parts of a Queensland tree growing in a dry area is that of *Eucalyptus pallidifolia*, the "Snapping Gum" of the extreme north-west of Queensland. Specimens of it were recently collected at Settlement Creek by Mr. L. Brass, who noticed the brittleness of the wood and bark.

Plant Associations of Charleville.

The mulga scrub is one of the most important plant communities of the district on account of the fodder value of the tree which is the principal constituent. It is frequently found in soil with a loose sandy surface and a hard, coherent subsoil strongly impregnated with iron compounds. Mr. L. C. Ball, Deputy Chief Government Geologist, who has just completed a tour of the western districts, informs the writer that he also observed this peculiar subsoil, and describes it as "hard pan" with a sandy skin. The hard subsoil, he states, is lateritic in a certain sense. Mulga scrub often consists of the mulga alone. At other times it contains a native fuchsia (*Eremophila Goodwinii*), an undershrub with resinous leaves and large blue flowers; poplar box (*Eucalyptus populifolia*); Moreton Bay ash (*Eucalyptus tesselaris*); "acacia" (*Cassia pleurocarpa*), a shrub with large yellow flowers; *Acacia Oswaldii*, a tree somewhat like mulga; cypress pine (*Callitris glauca*); corkwood (*Hakea Ivoryi*); and western sandalwood (*Eremophila Mitchellii*).

Cypress pine forests occur in some of the more sandy soils about the town. They are sometimes intermixed with poplar box. Western sandalwood forests of very limited extent occur in places near box and cypress pine forests.

Acacia Oswaldii forests were seen eastward from the town. They sometimes contain other constituents similar to those of the mulga scrub. Poplar box forests intermixed with silver-leaved ironbark and *Acacia Oswaldii* were also seen in a direction eastward from the town.

Forests composed almost exclusively of the Coolibar (*Eucalyptus microtheca*) occur westward from the town in the low country near the Warrego River.

The woody vegetation on the banks of the Warrego River is composed of the river gum (*Eucalptus rostrata*) and the coolibar. Nearer the bed of the river a tea-tree (*Melaleuca linariifolia* var. *trichostachya*) grows.

Forests composed of gidgee (*Acacia Cambagei*), occupy fairly large areas to the north-west of the town, and appear to be an accompaniment of the black soil which Mr. L. C. Ball describes as Rolling Downs (Marine Cretaceous).

Photo.: W. D. Francis.

PLATE 150.

Mulga scrub, Charleville. The large trees on left of picture are poplar boxes. On their right is seen mulga, which is eaten down in foreground by stock. The mulga tree in foreground on right has grown up out of reach of stock by development of a shoot near the middle when the tree was closely trimmed.

Photo.: W. D. Francis.

PLATE 151.

Mulga scrub, Charleville. The tree in the middle of picture is a small cypress pine (*Callitris glauca*).

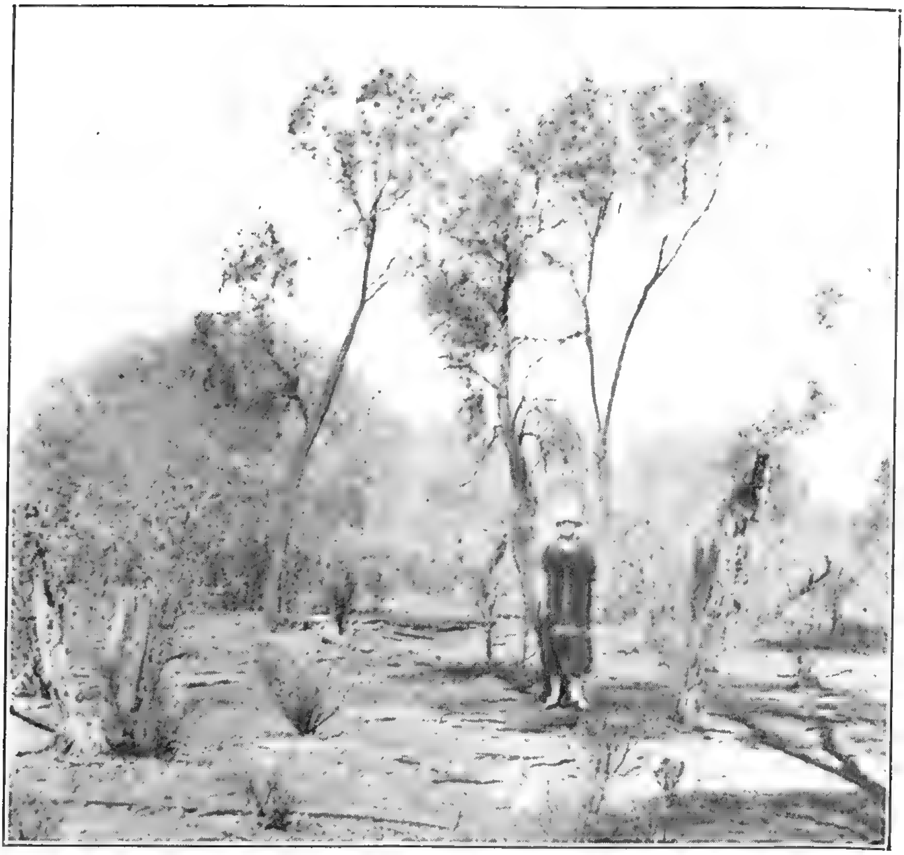


Photo.: W. D. Francis.

PLATE 152.

Mulga scrub, Charleville. The three trees in the middle of picture are corkwoods (*Hakea Ivoryi*). They are characterised by a very thick, deeply-fissured bark.

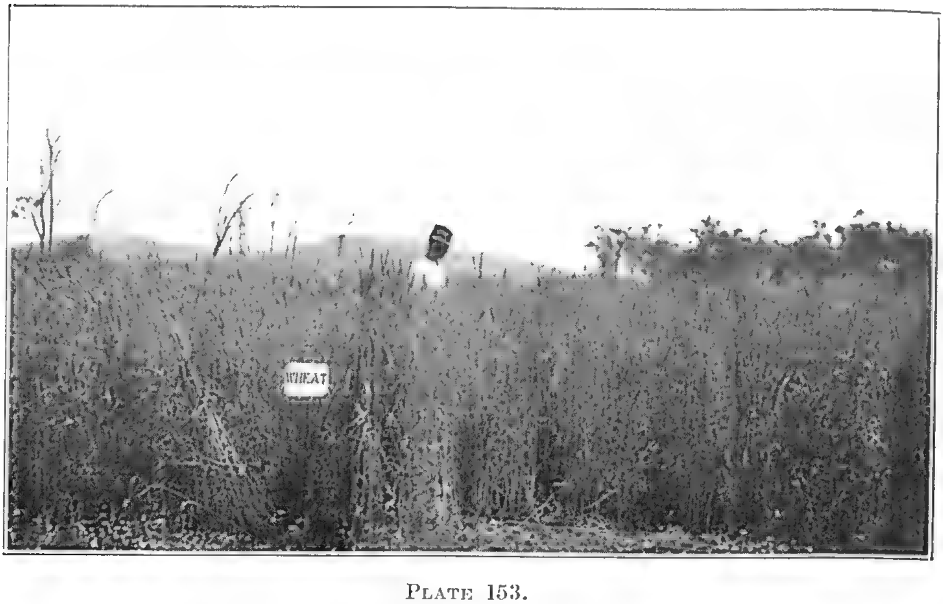


PLATE 153.

FODDER TEST CROPS. MONAL DEMONSTRATION FARM.

IMPROVING DAIRY HERDS—BETTER BULL CAMPAIGN.

GOVERNMENT ASSISTANCE—MINISTERIAL ANNOUNCEMENT.

The Minister for Agriculture and Stock (Hon. W. Forgan Smith) has outlined a scheme approved by the Government the objective of which is the improvement of dairy herds in the State. In the course of a recent Press interview Mr. Smith said that for some time past the Government has been endeavouring to improve the standard of dairy herds with a view to increasing production. The Departmental Herd Testing Scheme has been fairly well received. Last year 22,000 cows were tested, and this year applications to date have been dealt with involving 11,000 dairy cows. The scheme has been designed for the purpose of demonstrating to the farmer the profitable and unprofitable cows in his herd. "It is recognised, however," continued the Minister, "that more than this is necessary, and following on Government policy, Cabinet has approved of a scheme whereby assistance will be given to dairy farmers to purchase pure bred bulls. Subject to certain conditions, the Department of Agriculture will make available to the approved purchaser of an eligible bull a subsidy of 50 per cent. of the purchase price, provided this subsidy shall not exceed £50 and that the approval of the Minister is first obtained, and that both vendor and purchaser make the necessary declaration to meet the requirements of the Department."

Mr. Smith added that the subsidy will be available to farmers in districts that have been proclaimed under "*The Dairy Produce Act of* 1920." He anticipates that the practical assistance which the Government is prepared to render to dairy farmers will be the means of inaugurating what might be termed "A Better Bull Campaign."

The conditions attaching to the subsidy are as follow:—

1. The bull must have passed a tuberculin test by a veterinary officer within three months prior to date of sale.

2. The bull must be in good health, well grown, and true to type.

3. The bull shall be registered in a recognised herd book or be eligible for herd book entry.

4. The bull shall be not less than twelve months and not more than six years old, provided the Minister may approve of the purchase of an older bull which has sired high-producing females on official test.

5. The vendor of any bull, two years old and over, must produce evidence of fruitfulness in the preceding year.

6. The vendor of any bull shall produce concerning such bull a declaration of health on a form to be supplied by the Department of Agriculture and Stock.

7. The bull shall be the progeny of an approved sire and an officially tested dam which has reached the undermentioned butter fat standards during 273 days' milking:—

2 years and under 3	230 lb. butter fat
3 years and under 4	267 lb. butter fat
4 years and under 5	303 lb. butter fat
5 years	340 lb. butter fat

Over 5 years add 1/10 lb. butter fat for each day over 5 years up to 6 years.

The purchaser's application for subsidy shall be made on a form supplied by the Department of Agriculture and Stock. Any bull in respect of which the purchaser has received a subsidy as aforesaid shall, if required, be made available for the use to other dairymen, at a fee not exceeding 10s. per cow.

The purchaser of a bull shall have the right to refuse the service of such bull for any cows which he may have reason to believe to be suffering from disease, provided that the owner of such cows is unable to produce a certificate of a qualified veterinary surgeon to the effect that such cows are free from disease.

The bull shall be kept under conditions satisfactory to the Department of Agriculture and Stock.

In the allocation of subsidy by the Minister preference will be given to prospective buyers of eligible bulls who have submitted their herds to a butter fat test under the Herd Testing Scheme of the Department of Agriculture and Stock.

It shall not be permissible for the owner of a bull who has received subsidy to resell the animal without the sanction of the Minister.

THE POINTS OF A CLYDESDALE.

A few years ago, in the course of an extended tour through Northern Scotland, the editor of this Journal had the privilege of visiting many of the notable cattle and horse studs for which Scotland is famous the world over, and of meeting there studmasters whose names are known and whose work is appreciated wherever stockmen foregather. Among the best-known Clydesdale studs visited was that of Messrs. D. and W. Ross, of Bridgend and Dochearty, near Dingwall. Thirty-two animals, all practical working farm geldings and mares, were paraded for inspection, together with notable sires in which were represented all the more famous Clydesdale families. They were a fine lot and showed conspicuous evidence of the breeders' knowledge of their job. In the mob every strong point of type had been cleverly brought out and from notes made at the time the Scottish breeder's ideas of a true Clydesdale are as follows:—

Head.—Fairly long with ears likewise. A short, small, neat head and cocky ears are not generally in an animal of size.

Shoulders.—Well set-up at top, thin at withers. An animal with good length from the top of the shoulder to head generally arrives at good growth.

The Male.—Should be short in the coupling of withers and hip-bones.

The Female.—Should possess greater length of middle.

PLATE 154.—"GENERAL WALLACE."

One of the notable Clydesdales purchased by the Queensland Government for farm-horse improvement. He was bred in New Zealand by Mr. W. Kennedy, of Otarau, and is by "General Douglas," ex "Studleigh Queen."

Comparison.—As compared to a Shire horse with a leg at each corner and thighs bulging out from body, the Clydesdale's legs should be well knitted to the body without any prominences. An animal set in "bulldoggy" form is not a good mover. In Clydesdales more regard is paid to the body of the animal. The male should have a good forearm. In the female it should not be as largely developed.

Legs.—The animal should have a great knee-joint, tendons well back of bone, well-shaped pasterns, a good open foot, round and shapely and wide at heel. Knee and hock joints should be large and cleanly cut. The "feather" should spring from the back of the leg and should be silky in texture. Nature can be assisted by careful breeding. Long toes are a right development, but when they are too long the foot narrows. Heels should be brought down, frog to reach the

ground, throwing foot gently out. There should be plenty of room at the top of the coronets.

Body.—There should be great depth of rib, quarters of fair length, thighs with plenty of muscle, and down, narrow across hock joint, not too much bone, really flat and clean below hocks, the hind pastern rather longer than fore, but this can be overdone.

Pace.—The animal should walk with grace, freely, and with long step. Action should be perfectly straight, with no twisting. In well-bred animals the soles of the feet should be seen when walking, and fore-legs should be in a straight line. The Clydesdale is naturally an active breed, with good, clean action. In trotting, the foot should be lifted straight and put down straight. Exaggerated action is not desired.

The Stallion.—Unless a sire of good character and breed-type is used it is idle to expect a get of good class. Like any other breed, conformation—*i.e.*, the whole make-up of the animal, should be pleasing, with each part smoothly merging into the other, so making for evenness of line. Each part should be in proportion. A horse of good size is desired provided that mere size has not depreciated other essentials—viz., soundness of limb, quality and character.

Scottish breeders have produced an animal with long hair practically confined to the rear tendon, with a nice ''spat'' round the hoof head.

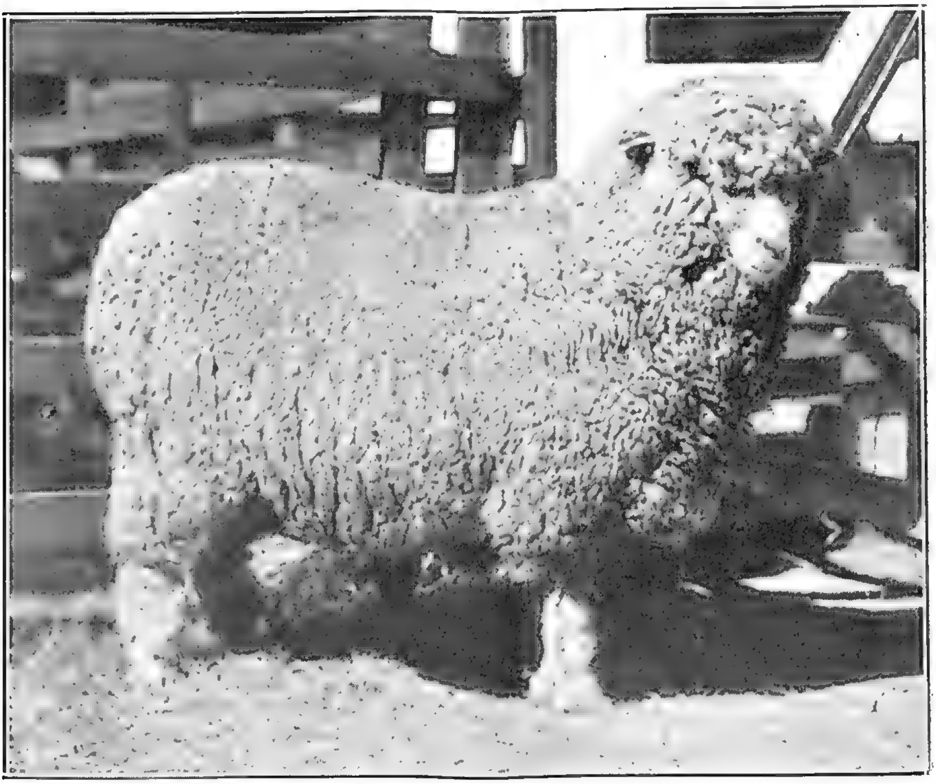


PLATE 155.—CORRIEDALE EWE.

CHAMPION ROYAL NATIONAL AGRICULTURAL SHOW, BRISBANE, 1925. THE PROPERTY OF MR. J. H. FAIRFAX, "MARINYA," CAMBOOYA, DARLING DOWNS.

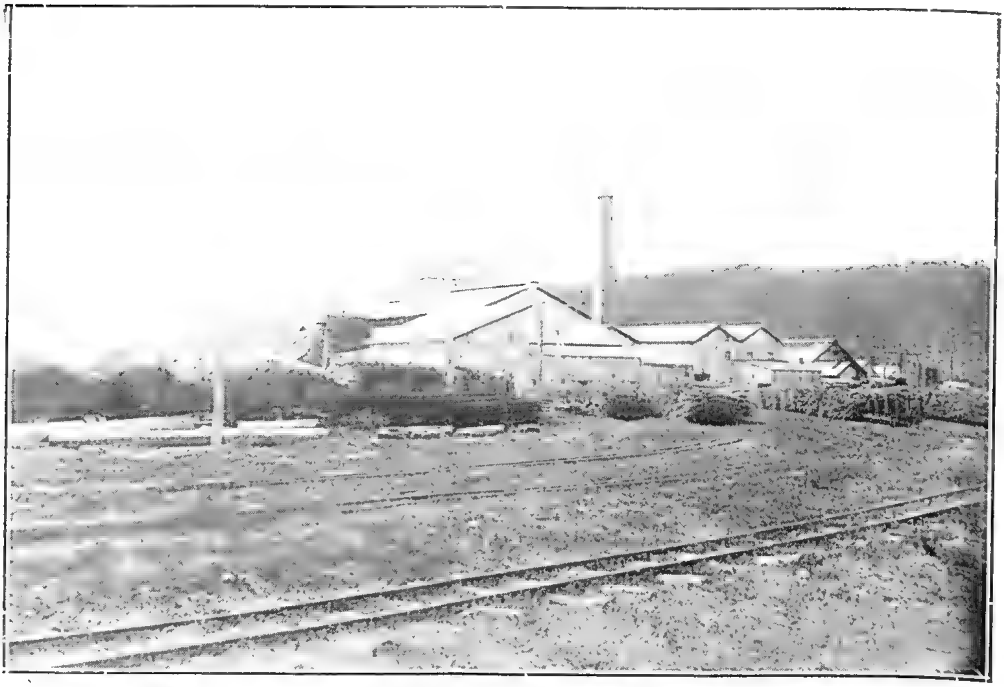


Photo.: G. B. Brooks.]

PLATE 156.—PLANE CREEK CENTRAL SUGAR MILL, SARINA.

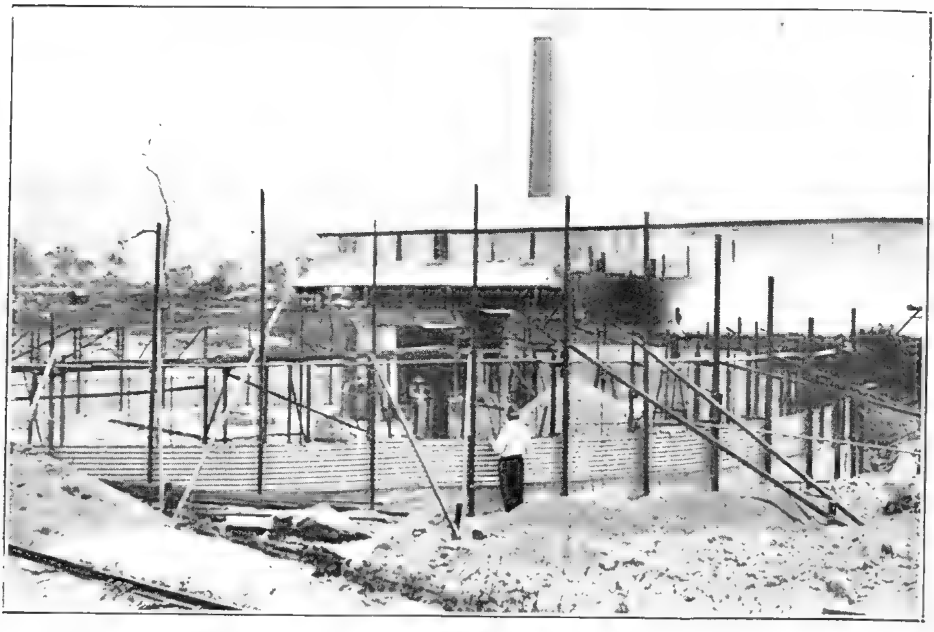


Photo.: G. B. Brooks.]

PLATE 157.—MOLASSES TANK UNDER CONSTRUCTION (90 FEET DIAMETER, 10 FEET HIGH)—PLANE CREEK CENTRAL SUGAR MILL, SARINA.

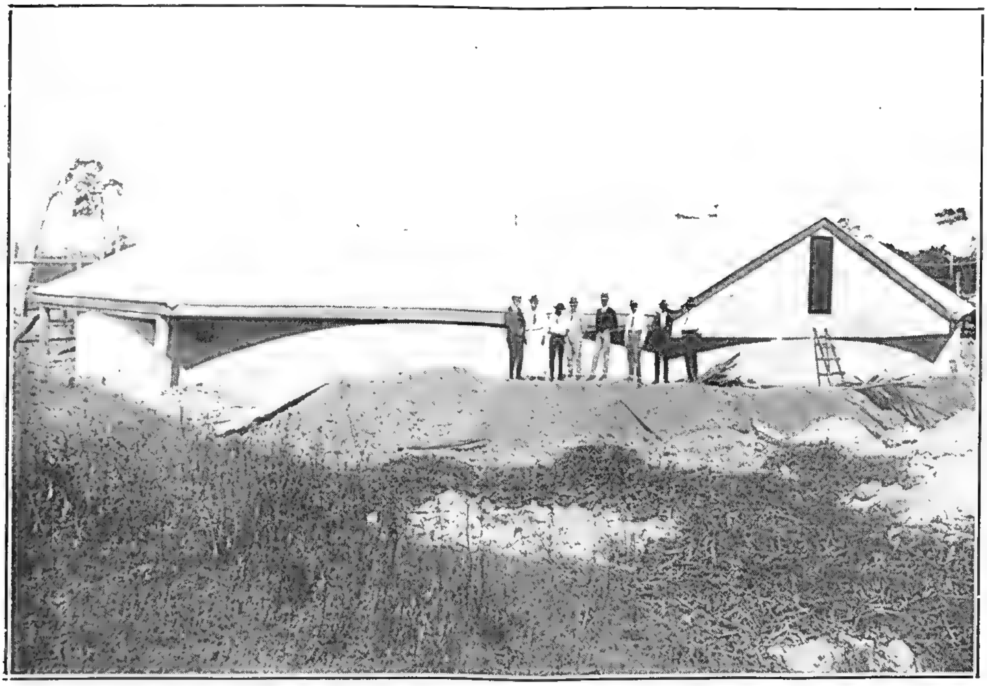


Photo.: G. B. Brooks.]

PLATE 158.—COMPLETED MOLASSES TANK, PLANE CREEK SUGAR MILL, SARINA

The tank which is 90 feet diameter and 10 feet high, is to store surplus molasses for use in power alcohol production.

Photo.: G. B. Brooks.]

PLATE 159.—UNLOADING FIRST LARGE CONSIGNMENT OF CASSAVA FROM JAVA, AT SARINA, 23RD NOVEMBER, 1925.

Photo.: G. B. Brooks.]

PLATE 160.—INSPECTION OF CASSAVA, CUTTING INTO SETS, &c., AT PLANE CREEK CENTRAL MILL, SARINA.

PLATE 161.—CORRIEDALE RAM.

CHAMPION ROYAL NATIONAL AGRICULTURAL SHOW, BRISBANE, 1925. THE PROPERTY OF MR. J. A. FAIRFAX, "MARINYA," CAMBOOYA, DARLING DOWNS.

MARKETING PIGS IN QUEENSLAND—VII.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The marketing of his products is claiming much closer attention from the man on the land, and in this series Mr. Shelton describes how pigs are handled at the selling end. In previous instalments several marketing systems with which Queenslanders are familiar were reviewed, and in the seventh article are many points of equal interest to the wide-awake pig-raiser.—ED.

The ultimate success attending the venture of the farmer who sets out to produce and market pork or bacon pigs in this State will very largely depend upon his ability to carry on satisfactorily under a variety of circumstances, some favourable, a great many adverse, and some altogether unsatisfactory. He will need to carefully study his losses and endeavour to eliminate as many of them as possible. The objective in this article is to illustrate ways and means of overcoming some of the losses from which the individual farmer, as well as the industry as a whole, suffers.

These points have all been emphasised by one or other of the various bacon curing concerns in this State, and are therefore the studied opinion of men who are actually handling the pigs both in transit to the factories and during the processes of manufacture and delivery for sale.

They cover a great deal of ground, but are, nevertheless, of very considerable importance in the development of the industry. Some of them, indeed, have been the subject of special pamphlets and articles by authorities in other parts of the world, as well as by the writer of this series, and are therefore worth diligent study on the part of the pig farmer.

Beginning at the production end of the journey to the consumer it will be well to emphasise a number of these losses—

(1) Losses due to unsatisfactory breeding stock, to the use of crossbred and mongrel boars and to sows of no known breeding, and to inbreeding—the result frequently of purchasing stock from neighbours who have no records of the breeding of their animals; or from purchasing indiscriminately at pig sales on the principle of ''appearance'' only, and anything so long as it is cheap.

(2) Losses due to inexperience, to improper foods and feeding, to insufficient food, and frequently also to overfeeding on fat-forming foods and foods of a very oily nature, such as peanuts.

(3) Losses due to insanitary piggeries, to low-lying, wet, or damp yards and sties, and to unsuitable pig sty buildings generally.

(4) Losses due to disease and abnormal conditions—particularly to such diseases as tuberculosis frequently the result of a weakened constitution occasioned by improper care—neglected coughs and colds, pneumonia (pants), pleurisy, or other bronchial or lung troubles, infection by bacteria of other diseases, parasitic infestation both internal and external. Losses due to improper castration and to complications—these are very serious, and are forming the subject of a special illustrated pamphlet on the proper castration of pigs, which will be available in January.

(5) Losses due to weaning pigs at too early an age, and to the sale of weaners six to eight weeks old in saleyards as store pigs; pigs which, unless very carefully handled, will fail to mature to advantage. Many losses are due to farmers offering for sale at pig sales animals which they know to be bad doers, and of whose health and constitution they have very grave doubts.

(6) Losses due to a lack of knowledge in so far as actual marketing is concerned. Many pigs reach the factories underweight and in very poor condition. Many are overloaded with fat. Quite recently many very soft ''peanut-fed'' pigs have been marketed. These have been unsatisfactory and unprofitable.

(7) Losses due to lack of proper exercise during fattening period, and to lack of sufficient green food (flesh formers) during this period.

(8) Overfeeding immediately before despatch has proved disastrous on many occasions.

(9) Absence of watering facilities whilst in transit.

(10) Slowness of trains carrying live stock; excessive bruising and damage to carcasses *en route* from farm to factory. These form the subject of a number of special recommendations herein.

The deaths which actually take place under the eyes of the buyers at saleyards, trucking stations, &c., chiefly arise from overfeeding shortly before delivery at yard. Other causes of deaths at yards would arise from absence of proper loading facilities at the farm, bad handling during unloading, unsuitable wagons and exposure to heat on the way to the sale or trucking yards, and fighting at yard and consequent overheating.

Speaking generally, losses by death in transit have been greater with pigs trucked long distances than those travelling short journeys; greater during hot weather than cold; greater with weighty fat pigs than with small or porkers; greater with crowded trucks than with uncrowded trucks.

Losses Due to Unsatisfactory Breeding Stock.

Experience gained as a result of an extensive tour through many of the pig-raising districts of this State demonstrates that there is abundant scope for improvement in the class of breeding sows kept on our farms, and in the use of better sires, though in very geenral terms it might be definitely stated that our pigs as a whole compare very favourably with those produced in the other States of the Commonwealth. It is unfortunately not an easy matter to bring about this general improvement in the quality of our breeding stock, for it requires both time and money and a great deal of experience to do these things. Stud farms from which better type breeding stock can be purchased are comparatively few and far between; those breeders specialising in this class of stock report a rapidly increasing demand, they have been hard pressed to keep orders supplied, but in many instances though the demand warrants it they have not had the necessary capital to finance extension of their operations, for with them as with most other pig farmers the piggery is but one branch of the farm's activities. It is, however, good to note that there is an increasing demand for better breeding stock, for the future of the pig industry depends entirely upon the success of those engaged and those contemplating engaging in the industry now. Crossbred and mongrel boars have been and are still being used far too freely. Some farmers do not appear to know that the use of a crossbred or mongrel sire is disastrous even though the animals themselves may look quite "O.K." Their use on mongrel sows or sows of no known breeding certainly spells disaster, while a farmer would be extremely foolish to mate a crossbred or mongrel boar to a sow of good breeding and type.

In pig-raising as in every other vocation the best and only the best should be considered if good results are to be expected. The writer will be pleased to assist any farmer in this direction either by the person selection of breeding stock or by putting them in touch with breeders who have reliable stock for sale. A good deal has been done on these lines during the past two years, but ample opportunity offers for a further extension of this service. Details of stock we know to be available for sale will be willingly supplied at any time.

One of the secrets of success in pig raising is the selection of breeding stock from large, thrifty, healthy, and profitable litters, and from stud breeders who can give a health declaration and a correct record of the breeding of their animals with every pig sold. The indiscriminate purchase of breeding stock at pig sales on appearance only, or because they happen to be "going cheap," is to be strongly condemned. Quite recently the writer visited a stud from which a number of stud animals had been distributed. About this time a consignment or two of culls in the form of barrows, badly teated sows, &c., had been sent to a co-operative bacon factory with the result that the manager advised that certain pigs and several "heads" had been condemned on account of the presence of tuberculosis. This farmer remarked quite innocently that he intended sending his next lot of pigs to the local saleyards, where either pork or bacon buyers could operate or where they could be sold "under the hammer." One could quite imagine farmers "hopping in" and purchasing sows from this consignment if they happened to meet a falling market or if competition was restricted and prices were lower than usual. This surely emphasises the necessity of giving careful attention to the selection of breeding stock if one hopes to succeed.

Get the Pure Bred Idea and Keep Better Breeding Stock.

The writer has been approached on many occasions when attending pig sales by farmers anxious to purchase breeding stock. Their requests are generally for a general inspection of the boar or sow to see if he or she is good enough for the

purpose. The first question put to the farmer is usually to ascertain what knowledge he has of the particular animal under inspection. Whether it is from a reliable healthy herd, whether it is a good doer, likely to continue developing till it reaches maturity, whether it is from a large thrifty litter or whether it is one of three or a similar-sized litter, whether it carries any guarantee of breeding, &c., &c. These are all important questions which the seller should be prepared to answer promptly and willingly if he is a genuine seller. The questions speak for themselves; sometimes a sale results, more often the farmer is advised to look elsewhere for the purchase of his breeding stock as the risk of indiscriminate purchase at pig sales is too great for the struggling farmer.

Price should not be the only consideration, for a good breeding sow or an active vigorous prepotent boar is worth far more than its ordinary "meat" value. This is a most important point which should not be overlooked.

Losses Due to Inexperience, and Improper Foods and Feeding.

The whole subject of foods and feeding is one worthy of the most serious consideration on the part of the pig farmer. It is hoped in due course to have a complete treatise available on this subject, meantime the pamphlet entitled "Pig Raising in Queensland" carries a good deal of useful information. This pamphlet with others referred to elsewhere in this issue may be obtained on application to the Department of Agriculture and Stock, William street, Brisbane.

The three outstanding features of successful pig raising are:—

(1) Knowledge of the job, personal attention to all details of management, reliable breeding stock and a good farm.

(2) Efficiency in all operations, keeping an ever-watchful eye on the growth and development of each animal, studying carefully the costs of production.

(3) Co-operation in developing the industry, in the production of all food supplies on the farm, in the marketing of the stock, and in uplifting the industry by co-operating with the Department of Agriculture and Stock in its efforts to keep disease out and to place the industry on a successful basis.

These words written two years ago as an introduction to the pamphlet "Pigs for Profit" appear truer than ever to-day, especially in so far as they refer to the growth of the food supplies on the farm, and to co-operative effort in building the industry up. During recent months, however, a good deal of trouble has been experienced in some districts as a result of growing too many peanuts, or at any rate feeding pigs too heavily on peanuts during the fattening stages. This has been the direct cause of heavy losses from soft oily pork, meat and fat which would not "set" or firm up no matter how long it was kept in the chilling or curing rooms; and for which very low "small goods" price has had to be accepted to clear supplies.

This subject will form material for a special article in our next issue. It is one of the utmost importance.

The two outstanding faults in Queensland bacon pigs during the past two years are:—

The pigs are being held too long on many of our farms, thus they are over the profitable limit in age when marketed.

They are too fat and too heavy for the curers and for the best local and interstate trade, thus they are less profitable to the farmer than they should be.

The remedy lies in a better knowledge of the subject of feeds and feeding, and the balancing of rations with the judicious use of ample supplies of green food and an abundant supply of fresh drinking water.

Losses Due to Insanitary Piggeries.

An illustrated pamphlet dealing fully with the construction of pig-sty buildings is in course of preparation and will, it is hoped, be available early in the New Year, for the subject is one of very considerable economic importance in the production of both pork and bacon pigs as well as of pigs for breeding and sale purposes generally.

Certain it is that the losses from causes outlined here are exceedingly heavy in every part of the State, many piggeries are situated in low-lying, wet, or damp places totally unsuited to the purpose; others have been in use continuously for so many years that they have become veritable bog holes in wet weather and extremely

dry dusty spots when the weather is more favourable; the pig pens are frequently erected in the lowest portion of the yards and very soon become quagmires when heavy rain falls. Many piggeries are but tumbled down, unsightly, and insanitary structures in which it is with the utmost difficulty that the pigs are confined at all. Quite recently one farm was visited on which the pig pens were low dark structures with a log fence scarcely 2 feet high. Just as it happened the boar had broken out and on our arrival the farmer was giving the boar a good thrashing with a lengthy stock whip, remarking the while in rather raucous language that the next time he dared to get out of his pen he would get a bullet in his skull. One could not but help feel that the low tumbled-down fence was nothing but an invitation to the animal to seek a better home on his neighbour's farm where the buildings were of a much better type. Pigs will be "pigs," I suppose, and it is but natural for a boar to seek wider range, and unless the pen and its fencing are of a satisfactory nature the results will never be good.

It is unfortunate that we are compelled to admit that the pig sties on most of our farms are quite unsuited to the job, though it is satisfactory to note that during the last three or four years considerable improvement has taken place in this as in other branches of the pig sections on many farms.

The whole subject will, however, be dealt with in as complete a manner as possible in the "Construction of Pig Sty" pamphlet, copies of which will be available gratis at an early date.

Losses Due to Disease and Abnormal Conditions.

The following figures taken from the Annual Report of the Department of Agriculture and Stock for the year 1924-1925 show the position in regard to trade losses as indicated by result of inspection of carcasses at Queensland Bacon Factories.

Return of swine slaughtered and condemned at bacon factories in Queensland for the year ended 30th June, 1925.

Swine Slaughtered.	Carcasses and Portions Condemned.	Disease.	Percentage.
206,505	861 carcasses ..	Tuberculosis	·416
	8,826 heads	Tuberculosis	4·273
	625 heads	Abscesses	·302
	7 forequarters ..	Abscesses	·0016

Return of swine slaughtered and condemned at various country slaughtering establishments. This list is compiled from returns furnished by permanent officers of the department performing slaughtering duties at the following centres:—Brisbane, Toowoomba, Ipswich, Gympie, Maryborough, Bundaberg, Rockhampton, Mount Morgan, Townsville, Warwick, Charleville, Bowen, Roma, Dalby, Clermont, Barcaldine, Cloncurry, Springsure, Gladstone, Mareeba, Longreach, Normanton, Charters Towers, Mackay, Gayndah, and Beaudesert (*vide* report of Chief Inspector of Stock).

Swine slaughtered and condemned at country slaughtering establishments for year ended 30th June, 1925.

Swine Slaughtered.	Carcasses and Portions Condemned.	Disease.	Percentage.
33,340	126 carcasses	Tuberculosis	·376
	845 heads	Tuberculosis	2·534
	9 carcasses	Abscesses	·026
	134 heads	Abscesses	·401
	4 carcasses	Emaciated	·011
	3 carcasses	Pleuro-pneumonia ..	·008
	1 carcass	Dermodex	·0029
	1 carcass	Decomposition ..	·0029
	1 carcass	Bruised..	·0029
	1 forequarter ..	Gangrene	·0014
	6 heads	Unwholesome	·0179

It is difficult to estimate the financial losses the result of these condemnations. They are heavy enough to warrant greater care and attention to the matter of

selection of farm and building sites, selection of healthy vigorous and profitable stock, proper care and attention to all matters connected with feeding and management, and greater care in marketing the animals when ready for slaughter.

These returns, after all, only indicate the actual losses the result of condemnation, but it would appear that the losses to the industry and indirectly to the individual farmer are much heavier, including the result of excessive bruising in transit to market, and deaths in transit (which fortunately are very light considering the long distances over which pigs are trucked during the warmer months of the year).

The economic losses the result of the infestation of animals by both external and internal parasites are also heavy. These will be dealt with in pamphlet form during the coming year in the hope that our losses may be considerably reduced by having a better knowledge of the life history and effects of these parasites.

Losses Due to Improper Castration.

As indicated above these losses are very serious and are forming the subject of a special illustrated pamphlet on the "Proper Castration of Pigs," a pamphlet it is hoped to have available early in January, 1926.

Discussing this matter recently with one of our Meat Inspectors he stressed the urgency of improving the methods employed in the castration of male pigs, for he stated our losses must run into 1 per cent. or more every week. With some factories treating 1,000 or more pigs per week 1 per cent. means ten pigs or

PLATE 162.—PHOTOGRAPH OF HAM, SALE VALUE OF WHICH HAS BEEN REDUCED MORE THAN 50 PER CENT. AS A RESULT OF IMPROPER CASTRATION.

The portion marked "A" represents abscessed areas, which would have to be cut away before this ham was "passed" as fit for human consumption.

portion thereof—a heavy loss indeed through a simple operation, which, if properly performed leaves no ill-effect, nor does it injure or check the growth of the animal at all if performed when the pig is six weeks old—the correct age for castration in pigs.

The illustrations in the "castration" pamphlet will clearly show how these losses are sustained, and will very clearly emphasise the necessity of learning to perform this operation correctly before attempting same on any pig except it be a porker killed for consumption on the farm. The writer will willingly arrange practical demonstrations in castration on a porker killed for farm use at any convenient centre in the course of his travels through the State. L.P.A. secretaries please not for future attention.

Dealing with the subject of losses due to deaths of pigs in transit and through excessive bruising, &c., the following information was supplied recently by one of the bacon factories operating in Southern Queensland, this information speaks for itself and emphasises again the urgency of the instructional campaign among pig-raisers of this State. An excerpt from this letter reads as follows:—"For your information I beg to advise that from the 1st January to 30th June of this year 93 pigs owned by us died either in transit to the works or very shortly after their arrival there; 78 were condemned, while we have had no less than 722 bruised hams and 559 bruised flitches in that period. There are many causes, of course, to which bruising may be ascribed as well as the deaths in transit. . . ."

PLATE 163.—ANOTHER RUINED HAM.

The area marked "B" is abscessed to such an extent as to necessitate cutting deeply into the fleshy portion of ham to remove all traces of this damage. Improper castration results frequently in serious abscess formation in this portion of the carcass.

Another factory had this to say: "What pigs we are unfortunate enough to lose are caused through not having proper trucking facilities. If the trucking yards, &c., were attended to the loss of pigs would be nearly nil. . . ."

Another smaller factory wrote on these lines:—"In *re* losses through deaths in trucking we have had very little trouble in this direction, and what few losses we do sustain are chiefly caused through over-crowding in hot weather. Round about our district we are particularly fortunate in respect to condemnations. We have occasional heads condemned, and on rare occasions have the misfortune to have a body condemned. About the only cause of condemnation here is tuberculosis.

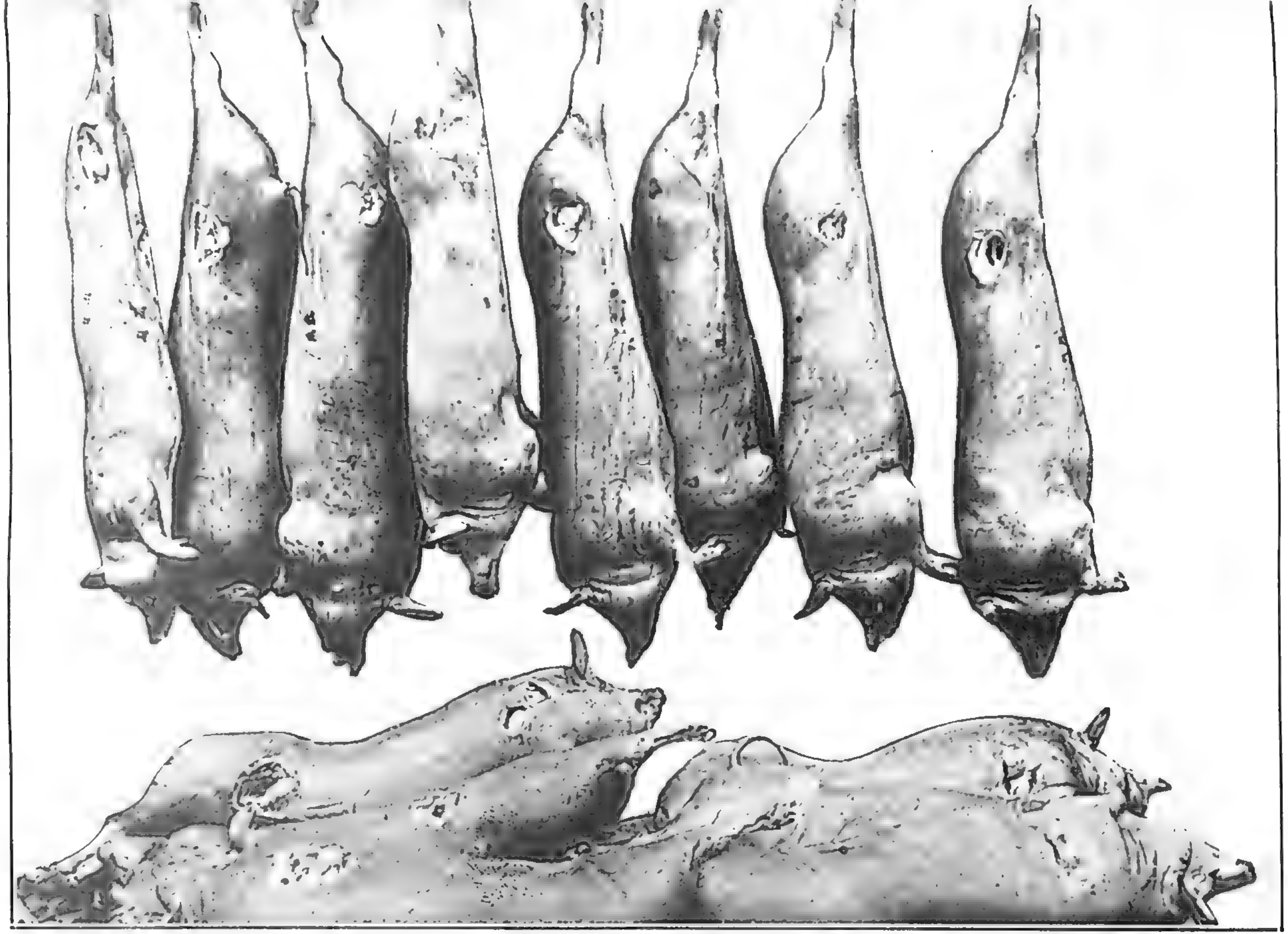


PLATE 164.

This Photograph illustrates very strikingly the serious effects of bruising and damage in transit to the factories of pigs of various weights, in both prime and lean condition. The Meat Inspector is compelled to cut away all abscessed, bruised, or otherwise damaged areas, and as may be noted his knife has been at work on these carcasses. The animal value has in every instance been reduced very considerably as a result of this rough handling. It behoves every farmer to see that his pigs, or those of his neighbours who might be trucking at the same time, are handled more carefully than was the case with the pigs illustrated.

Other complaints are practically unknown to us. At times we have a good many losses through bruising, and as those in charge of loading are generally careful men the only reason we can assign for this is either carelessness in loading on the part of the farmer when he is taking his pigs to sales, or to knocking about received in transit per rail.''

These letters are worth careful study. They are the studied opinions of men actually handling thousands of pigs each year in both Central and Southern Queensland.

The following is the preliminary draft copy of a special notice which is to be exhibited in the form of a printed calico notice at all pig-trucking stations and railway sidings where pigs are loaded into trucks, for the information of pig raisers generally.

This notice has been approved by all of the Queensland Bacon Factories, and also by the Commissioner for Railways, and it is hoped as a result that the information thus broadcasted will be of permanent value to the industry, for certain it is that our losses due to deaths in transit and to excessive bruising are heavier than they ought to be.

Losses Due to Injury in Transit.

Queensland bacon-curers affirm that the pig farmers of this State suffer loss to the extent of *thousands of pounds sterling* annually through *careless handling of live pigs in transit to market,* this the result of *excessive bruising and damage, deaths in transit, &c.*

Your attention is *specially drawn* to the *following general recommendations:—*

Remember that the great demand now is for prime light to medium weight fleshy bacon pigs.

See that your pigs are properly fed and ''topped up'' on grain food for several weeks before marketing.

Give your pigs ample exercise during the growing and ''topping up'' stages. Do not keep your pigs closely confined in small sties, as this is conducive to over-fatness and to soft flabby fat.

Allow your pigs clean drinking water at all times and provide shade and protection from the effects of the weather.

Be careful to market at correct weight; you should weigh your pigs regularly and accustom them to being handled and driven. Ask your factory for their current schedule of weights and prices.

Avoid beating the pigs with whips, rods, or sticks; every time you strike them you inflict a bruise which reduces the animal value.

Do not feed your pigs on the morning of despatch, they travel better on an empty stomach, but provide plenty of clean water. We are endeavouring to have the railway authorities provide water troughs and water at all pig-trucking stations, and, if possible, for water to be supplied en route to destination.

Co-operate with your neighbours in arranging assistance at sale and trucking time.

Firebrand your pigs with your registered firebrand. Ear marks and ear tags have not proved satisfactory; the factories prefer fire branding.

Be certain that the factory receives early advice *re* your consignment, the numbers, grade, brand, mark, and time and date loaded. Hand a written statement to the buyer or official loading agent.

Co-operate with the Railway Department and the factories in their endeavours to deliver your pigs at destination in the best condition possible.

Use purebred boars only and sows of the best breeding you can obtain in producing your pigs and buy store pigs only from reliable sources.

Help us to help you succeed in the industry.

Write to the Department of Agriculture and Stock, Brisbane, for all available information on the subject of pig raising.

Issued under the authority of the Department of Agriculture and Stock, Brisbane, Queensland, 1925.

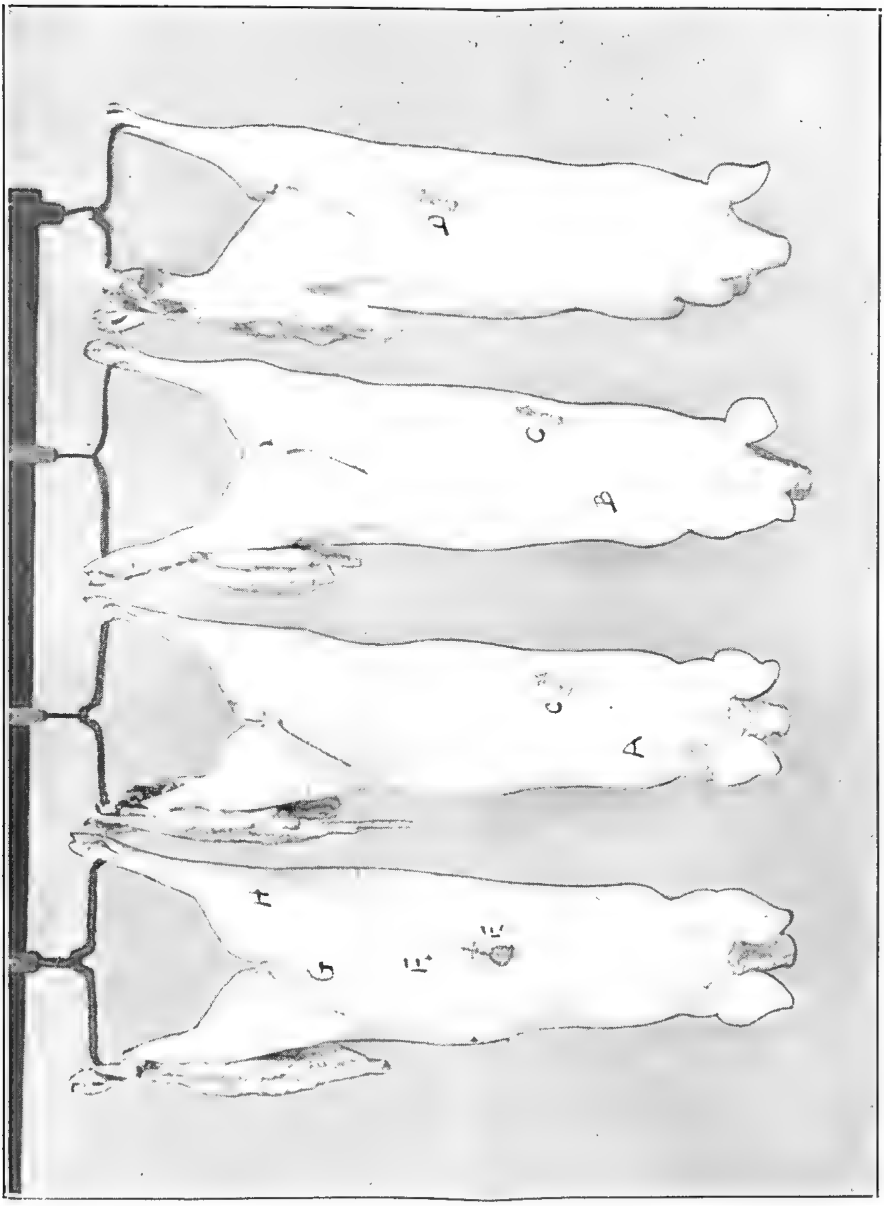


Plate 165.

BACON PIGS FIREBRANDED WITH THE REGISTERED BRAND $\frac{+}{\mathrm{C}}$.

Note Remarks regarding Position of Firebrand.

A is the position preferred by factory managers, *i.e.,* just off the top of the shoulder, yet not too far down side. B is also a good position, but being on the point of shoulder blade the brand is liable to slip and blur. C is not a good position, though it is preferable to D, which is an awkward position if the pig squats down on its haunches, as it probably would do if in a crush or among other pigs. E is in a bad position from the factory point of view, while F is decidedly bad. The positions marked G and H, or in fact anywhere on the loins or hindquarter, should not be selected as the site for the brand as the tendency is to damage the ham, the most valuable portion of the carcass. Great care should be taken to mark the pigs in the correct position and to have the brand at the correct heat before applying. Where pigs have a coarse heavy coat of hair it would be preferable and much more effective to have a pair of horsehair clippers to clip the hair off the spot before applying the brand. This may seem too much trouble to the busy farmer, but it means a great deal to the factory people to have clean, attractive, readily distinguished brands.

PLATE 166.—THE CUTTING-UP ROOM AT THE ZILLMERE BACON FACTORY.—J. C. HUTTON'S LTD.

Every care and attention is given to the carcass in its journey to the consumer in order to ensure to all concerned a satisfactory, saleable, and attractive article.

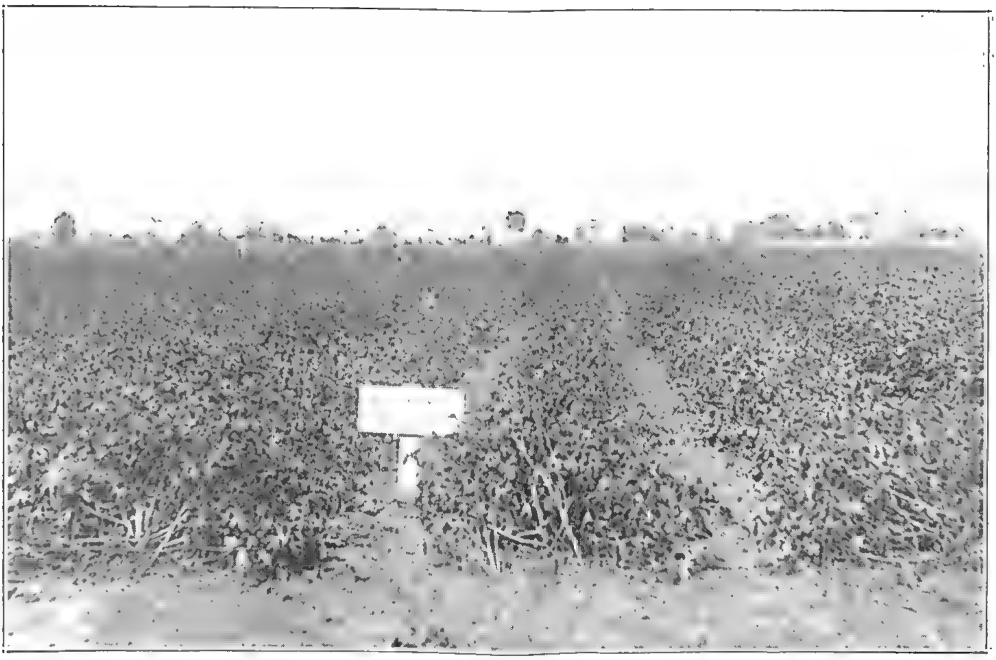


Plate 167.—Cotton Ratooned at Gatton College.
(*See* letterpress, p. 523.)

Plate 168.— Gatton College—Annual Cotton.
(*See* letterpress, p. 523.)

PLATE 169.—CALLIDE RESEARCH FARM—DURANGO COTTON CROP, 1924–25.
(*See* letterpress, p. 523.)

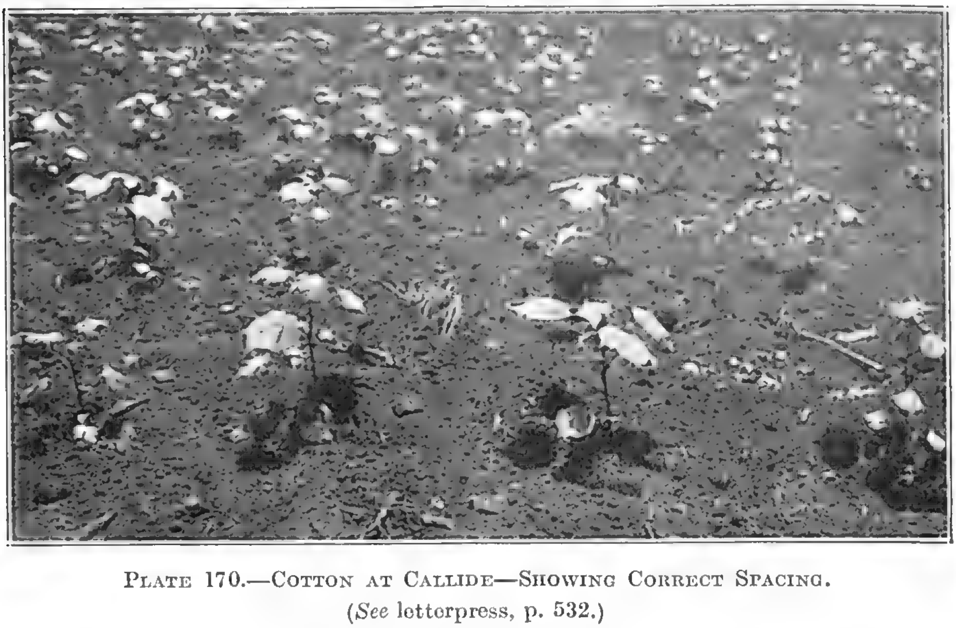


PLATE 170.—COTTON AT CALLIDE—SHOWING CORRECT SPACING.
(*See* letterpress, p. 532.)

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING OCTOBER, 1925 AND 1924, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Oct.	No. of Years' Records.	Oct., 1924.	Oct., 1925.
North Coast.	In.		In.	In.
Atherton	0·96	24	1·02	0·11
Cairns	1·92	43	0·58	0·25
Cardwell	2·04	52	1·19	...
Cooktown	1·09	49	0·58	0·07
Herberton	0·94	38	0·70	0·06
Ingham	1·63	33	1·75	0·12
Innisfail	2·93	44	0·86	3·62
Mossman	2·96	17	0·54	2·63
Townsville	1·30	54	3·09	0·09
Central Coast.				
Ayr	1·05	38	3·00	...
Bowen	1·10	54	3·96	0·06
Charters Towers ...	0·71	43	1·46	...
Mackay	1·81	54	0·42	0·13
Proserpine	1·89	22	5·58	0·17
St. Lawrence ...	1·81	54	1·66	0·06
South Coast.				
Biggenden	2·35	26	6·48	0·25
Bundaberg	2·05	42	1·75	0·61
Brisbane	2·57	74	1·63	0·35
Childers	2·51	30	7·34	0·66
Crohamhurst ...	3·61	30	6·34	1·38
Esk	2·47	38	2·76	0·39
Gayndah	2·41	54	4·96	0·16
Gympie	2·73	55	5·11	1·31
Caboolture	2·58	38	3·47	0·61
Kilkivan	2·64	46	5·49	0·18
Maryborough ...	2·66	53	4·27	0·82

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Oct.	No. of Years' Records.	Oct., 1924.	Oct., 1925.
South Coast—continued:	In.		In.	In.
Nambour	3·06	29	5·24	1·70
Nanango	2·38	43	7·01	0·07
Rockhampton ...	1·87	38	1·84	0·70
Woodford ...	2·62	38	5·54	...
Darling Downs.				
Dalby	2·08	55	2·59	0·22
Emu Vale ...	2·22	29	2·39	0·30
Jimbour	1·91	37	4·10	0·22
Miles	2·06	40	6·24	0·19
Stanthorpe ...	2·62	52	4·37	0·60
Toowoomba ...	2·61	53	2·12	0·38
Warwick	2·33	60	2·38	0·09
Maranoa.				
Roma	1·81	51	4·20	0·36
State Farms, &c.				
Bungeworgorai ...	1·64	11	4·61	0·21
Gatton College ...	2·12	26	1·70	0·14
Gindie	1·47	26	3·36	0·15
Hermitage ...	1·96	19	2·42	0·44
Kairi	1·19	10	...	0·02
Sugar Experiment Station, Mackay	1·70	28	0·46	...
Warren	2·28	11	3·48	0·67

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for October this year, and for the same period of 1924, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Meteorologist.

THE NORTHERN PIG BOARD.

Subject to a poll on the question, it is the Government's intention to extend the operations of the Atherton Tableland Pig Pool Board until 31st December, 1930. The proposed new board will not only apply to the Atherton Tableland, but will include the Petty Sessions Districts of Atherton, Herberton, Chillagoe, Cairns, Douglas, and Mourilyan, and will be known as the Northern Pig Board. The board to deal with the commodity will consist of five representatives of growers and one appointed by the Minister. Any petition for a poll to decide whether the proposed board shall be formed must be signed by at least fifty growers, and must reach the Minister before 12th December. Nominations for growers' representatives on the board will be received up to 12th December, and each nomination must be signed by at least five growers of pigs.

General Notes.

The Royal Society of Queensland.

At the last ordinary monthly meeting of the Royal Society held in the Geology Lecture Theatre of the University, the President, Prof. R. W. Hawken, B.A., M.E., M. Inst. C.E., was in the chair.

The meeting, to which the public was invited, was devoted to the celebration of Huxley's Centenary. The following addresses were given:—

Huxley: Personal Characteristics, by Mr. Heber A. Longman;

Huxley: The Biologist, by Professor E. J. Goddard;

Huxley: The Educationalist, by Professor J. P. Lowson.

The various aspects of the life and work of Thomas Henry Huxley were dealt with in an interesting way by the three speakers, and the addresses were greatly appreciated by the large audience.

For Profitable Horse-Breeding.

A horse-breeder may have first-class mares, and he may breed them to sires above the average, but unless he realises the importance of generous feeding to the brood mares and foals his efforts to produce good, well-developed horses will be sadly hampered. Feeding should be regarded as of equal importance to breeding, but we know that it is far from being recognised, and as a result of the neglect to feed breeding stock and the growing animals our markets to-day are over-supplied with undersized animals for which there is no demand. This is why many breeders cannot command payable prices for the horses they raise, and then they say, "horse-breeding does not pay."

Horse-breeding will, and does, pay the man who uses good breeding stock and who does not grudge giving chaff or grain to the brood mares and foals, especially during the winter or in dry seasons. It has become a saying that "the cheapest fuel is that grown on the farm," and a breeder should reserve a liberal supply for his horses, which should produce all the farm power he requires, while his surplus stock will help to add to the profits of the farm.

Sources of Nitrogen—The Action of Soil Organisms.

Although leguminous plants are most widely known as enriching the soil in nitrogen, which they obtain from the air, it is of interest to note (says a writer in the South African "Farmers' Advocate") that there are other sources by which free nitrogen may be drawn upon and deposited in the soil for future use. Experimenters are realising that there is evidence that leads to the belief that the direct fixation by bacteria, independent of legumes, is by far more important than it was thought to be until recently.

Observation has certainly shown that soil which is cultivated without the aid of legumes may hold its nitrogen content fairly well, and this points to the conclusion that the direct fixation of nitrogen independent of legumes is of very great significance, and possibly the greater factor concerned with the process of the fixation of nitrogen. We thus see that the whole problem of soil fertility is inextricably interwoven with the action of micro-organisms.

From the origin of the soil, then, through its use by plants and the subsequent destruction and change of their original condition, every step is associated with the action of these organisms.

In the future the problem of the proper treatment of the soil by the agriculturist may become to a large extent one of the control of these infinitesimally small soil workers, and he may have to learn how to stimulate the activities of those which are desirable in the maintenance of a supply of plant-food in the soil. Cultivation, associated with moisture and warmth, is the means of assuring this. Therefore, the thorough cultivation of the land increases soil fertility.

Electrical Treatment of Seeds.

Various experiments to test the utility of electricity in crop production have been carried out at different times.

In connection with the treatment of seeds, several kinds of vegetable seeds have been tested, but with negative results. There is local evidence to show that in some cases electrically-treated tomato seed has taken longer to germinate than untreated seed. In one case the electrically-treated seed germinated in fourteen days, while the untreated seed germinated in five days.

The question of electricity in relation to plants and plant growth is at present undergoing investigation in different parts of the world. The latest available results are to the effect that seed treatment has no appreciable effect on the subsequent character or yield of the plants. In most instances the seeds were immersed in an electrolyte of brine, and subjected to the action of the current. The high-tension electric discharge, however, has resulted in increased yields of a number of crops when treatment was applied continuously throughout the growing season.

Claims have been made that seed treatment by electrical means has resulted in marked changes in the subsequent crops, but these have not been substantiated in carefully conducted trials, and the matter is for the present in the experimental stage.

Grazing of Stock—The Danger of Overstocking.

It may be laid down as a rule to which there is practically no exception that the increase in the risk from disease occasioned by overstocking is out of all proportion to the increase in the number of stock added to those already on a given area. This increase in risk involves three types of disease—infectious, parasitic, and dietetic. The chances of infectious disease spreading is, of course, obviously greater where animals come into more direct contact with one another, and the longer such contact is continued the greater the risk. Since in most instances of parasitic infestation the eggs or embryos of the parasites are passed out of the animal with the fæces, it is equally obvious that the more stock are crowded together the more they will tend to become reinfected with the parasites.

Dietetic diseases are in most instances only to be expected when overstocking is continued for a long period; such diseases are sometimes so delayed in their appearance, and the exhaustion of the soil by overstocking is also so gradual that it is difficult at first sight to connect the two, but the connection undoubtedly exists. This refers to overstocking of a whole holding. It is, of course, often economically sound and wise from a health point of view temporarily to overstock some portion of a holding, even to a very marked extent, and then to allow that portion a rest from stocking. Changes such as this practice lead to benefit both of stock and pastures.

The danger from crowding many stock together on small areas is most marked in the case of young stock—particularly calves. Concerning the dangers peculiar to grazing on certain types of country, mention may be made of paddocks particularly subject to blackleg, of swampy and low-lying country likely to favour the development of parasites, and of small areas on which certain markedly noxious plants may be growing. In dangerous areas of the first type, spelling, or better still, cultivation, have been found beneficial; in the second, draining, cultivation, and fencing off may be utilised; and for the third, either the cutting of the plant or the interference with its accessibility for stock. When the last-named measures are impracticable, much loss may at times be saved if, when the stock first get on to the area they are watched carefully, and instantly removed on the first sign of sickness. Instances, too, are not wanting where loss has followed the deliberate disregard of warnings issued by competent authorities.

Water on the Dairy Farm—Some Labour-saving Suggestions.

Dairying is frequently made considerably more arduous than it need be, points out a writer in the New South Wales "Agricultural Gazette." It must be admitted that farmers, as a whole, do not take advantage of the many labour-saving devices which are available to them. Many, no doubt, cannot afford them, but it is equally true that many others can who still persist in the old laborious ways.

The first essential on a dairy farm is a plentiful supply of good water, both for use by the stock and for use in washing utensils, floors, &c. For the latter purpose, it saves many hours work, and the walking of many miles in a year, if water is laid on to the dairy and bails from an overhead tank, supplied either by windmill or other power. Most inland farmhouses are supplied with overhead tanks in this way, as the rainfall is often uncertain, and tanks supplied from the roof cannot be depended upon. Yet even where overhead tanks are already in use, it is the exception rather

than the rule to find water laid on to a dairy. In coastal districts, where the rainfall is heavy, the common practice is for the water caught from the dairy roof to be used for washing down. In dry periods this supply often fails, with a consequent serious effect on the quality of cream; so that even on the coast many farmers could greatly improve their own prospects by installing an independent water supply. The farmer's wife also, as a rule, has not the easiest row to hoe, and to have the water laid on in the house and garden is a very great convenience.

On the vast majority of dairy farms there is room for great improvement in the methods used in heating water. It is probable that, of all causes of second-grade cream, the washing of separators and utensils with lukewarm water without afterwards scalding is the greatest. The importance of a plentiful supply of boiling water cannot be stressed too much, for only by its use can cleansing be properly carried out. The essential part of "washing up" is the cleansing and sterilising of all those surfaces with which the milk or cream comes in contact. By sterilising we mean the destruction of all germ life, and the only way open for the farmer to do this is to use boiling water. Many diverse methods are in use for obtaining hot water; kerosene buckets suspended over an open fire is one common practice—slow, tiresome, and wasteful of fuel. Numerous farmers use a copper, and unless the copper is bricked in, and by a man who understands the work, this way is nearly as slow and uses nearly as much fuel as the open fire.

A fairly large volume of water, such as may be contained in a copper, will take a long time to heat to boiling point. The usual practice is to light the fire under the copper or other heating arrangement when starting milking, and when the milking and separating are done, if the water happens to be boiling so much the better, but if not, well, it is used just the same—the results often being, as previously stated, second-grade cream.

Sometimes the water is heated over a stove or open fire in the farm kitchen; and one farmer, who had a six-cow milking plant and a large herd, obtained all his water for washing up from the hopper of a water-cooled oil engine. Needless to say, his cream was always second grade, solely through the fact that he was not using anything like the quantity of hot water he should have been.

A cheap and easy method of securing plentiful supplies of boiling water is the ordinary chip bath heater. These heaters, which cost only a few pounds, will supply boiling water in a few seconds, using as fuel any waste material, such as old papers, brushwood, or chips. They are best used when connected by piping to either an overhead or rainwater tank, or other source of water supply, and it is hard to understand why more farmers do not make use of them.

Proposed Grain Board.

The following nominations have been received for membership of the proposed Grain (Maize) Board, which closed at the Department of Agriculture and Stock, on the 14th November, 1925:—

District No. 1 (Moreton).—No nominations received.

District No. 2 (Darling Downs and Maranoa).—Patrick McNee, Kingsthorpe; Harry Obst, Shepperd; George Burton, Cambooya; Thomas Braithwaite, Warwick; Joseph James Booth, Warwick; Henry Hildred, Gladfield.

District No. 3 (Rest of Queensland).—James Henry Sigley, Kingaroy; James Alexander Slater, Wondai.

Two (2) Members are required for each District.

Pamphlets for Pig Raisers.

The under listed pamphlets on pig raising may be obtained gratis on application to the Under Secretary, Department of Agriculture and Stock, William street, Brisbane. Applications may be made personally or by letter at any time.

"Pig Raising in Queensland," "The Dentition of the Pig," "Weaning the Pig," "Feeding Pigs—Feeding Problems," "The Berkshire Breed—Litter Records," "Concrete Feeding Floors," "Mineral Mixtures for Pigs," "Flushing the Breeding Sow," "Diarrhoea or White Scour in Pigs," "Paralysis of the Hind-quarters in Pigs," "A Peculiar Disease Affecting the Ear of Pigs," "Early History of the Pig," "Gestation Chart for Pigs," "Selecting the Boar—Points Worthy of Note," "Marketing Pigs in Queensland, Parts 2 to 6," "Pigs for Profit," "A Useful Fence for Pig Paddocks," "A Thrifty Profitable Litter," "Yorkshire Pigs," "Maize for Pigs," "Pig Clubs—Their Value in Queensland Agriculture," "Young Judges' Competitions at Agricultural Shows."

Pamphlets on "Castration of Pigs," "Construction of Pig Sty Buildings," and several others are in course of preparation, and will be made available on publication.

Egg Board.

His Excellency the Lieutenant-Governor (Hon. W. Lennon) has approved of the extension of the operations of the present Egg Board until the 31st December, 1925. The present members of the Board, namely:—J. R. Wilson, Eudlo; R. A. Chapman, The Gap; M. H. Campbell, Albany Creek (Chairman and Representatives of Council of Agriculture); H. M. Stevens, Lanefield; and J. Hutton, Kingsthorpe; will therefore hold office until the 31st December, 1925.

Atherton Tableland Maize Board.

His Excellency the Lieutenant-Governor has approved of an Order in Council by which the term of office of the present members of the Atherton Tableland Maize Board shall expire on the 31st December, 1925. This has been done in order to coincide with the election of members of District Councils of the Council of Agriculture. Members elected to the Atherton Tableland Maize Board after the 31st December, 1925, will hold office until the 31st August, 1927, and members appointed thereafter will hold office for one year.

Staff Changes and Appointments.

The Police Magistrate, Blackall, has been appointed Government Representative on the Barcoo Dingo Board.

The resignation of Mr. R. R. Anson as Assistant Instructor, Cotton Section, Department of Agriculture and Stock, has been accepted.

Mr. E. Barr, of Sunday Creek, Wondai, Mr. W. B. Alexander, of Sherwood, and Mr. E. F. Pollock, of the Royal Zoological Society of New South Wales, have been appointed officers under and for the purposes of the Animals and Birds Acts.

Mr. J. H. Simmonds, of the Department of Agriculture and Stock, has been appointed Plant Pathologist to that Department, as from the 1st January, 1926.

Losses Due to Weaning Pigs at Too Early an Age.

The economic loss to the industry as a whole through weaning pigs at too early an age is a very serious one—one that could very largely be minimised by a better knowledge of the business. Pigs should not be weaned or taken away from their mother till they are eight weeks of age, and if they can be allowed to run with the sow a few days longer, even to nine or ten weeks, so much the better; though where the objective is (as it should be) two litters per sow per year it will be necessary for the sow to be separated temporarily from the young pigs when they are between eight and nine weeks old, for it is at this period the sow will come "in season" and be ready for the service of the boar.

It is almost criminal to wean pigs at six weeks of age, place them in a cart or wagon and take them off to the pig sales to sell to some other farmer under whose care they will have an entirely different class of food to that to which they have been accustomed prior to weaning. The farmer who purchases them will be very fortunate indeed if the growth of these animals is not seriously checked by this early weaning, though it is admitted that with special care and attention and a "drop of new milk" they can, if they are specially well developed, be carried on without undue risk; but it is this special care and attention and the new milk (milk fresh from the cow and prior to passing through the separator) which is often lacking. Nevertheless thousands of young pigs suffer each year as a result of early weaning. This matter is treated in the pamphlet, "Weaning the Pigs," obtainable gratis on application to this department.

It is unfortunate also that we have little or no legislation dealing specially with the pig industry. This matter is, however, being looked into with a view to submitting a draft copy of a Pig Industry Act; an Act which would be designed with a view to strengthening the position of the pig farmer and in making the industry a more attractive and reliable one. It would aim also at introducing measures which would result in a better type of accommodation being provided for pigs generally, possibly also for the compulsory firebranding of all bacon pigs coming forward to our bacon factories in order that it would be possible to trace condemned pigs to the farm from which they came. This is only possible now with pigs coming forward to co-operative factories in which case firebranding or marking in some other way is necessarily compulsory as is understood and appreciated by all suppliers to these factories. It is felt that such an Act would eventually prove a Godsend to the industry, though doubtless at first many farmers would object to the introduction of legislation.

Reference has been made elsewhere in this issue to the question of farmers marketing in saleyards pigs of the health and wellbeing of which they have grave doubts. This is a question which breeders in their own interests should give attention to, and they should see to it that no stock leaves their farm for a saleyard or factory unless they are satisfied that the animal is in good health and in a marketable condition.—E. J. SHELTON, Instructor in Pig Raising.

State Wheat Board Election.

Following is the result of the voting for Districts 1, 2, 3, 4, and 5 in connection with the Wheat Board Election held on the 12th November, 1925:—

District No. 1—Old electorates of Maranoa, Dalby, Nanango, and Murilla, with the exception of the Goondiwindi Division.

	Votes.
Mulholland, William Thomas (Jandowae)	154
Swan, Robert (Wallumbilla)	279
Informal	10
Total	443

District No. 2—Old electorate of Pittsworth.

	Votes.
Edwards, David Robert (Nobby)	178
Harvey, Alfred John (Pittsworth)	259
Krieg, Arthur Carl (Brookstead)	429
Informal	7
Total	873

District No. 3—Old electorates of Warwick, Carnarvon, and the Goondiwindi Division of Murilla.

	Votes.
Bradford, Harry Curnow (Oman-ama)	163
Kirkegaard, Bergittinus Clemen Chris. (Freestone)	164
Informal	4
Total	331

District No. 4—The electorate of Cunningham—Muir, Thomas (Allora), returned unopposed.

District No. 5—Old electorates of Lockyer, Drayton, Aubigny, Toowoomba, and East Toowoomba.

	Votes.
Archibald, John (Oakey)	234
Chamberlin, John Thomas (Kingsthorpe)	177
Informal	7
Total	418

A Fine Berkshire Record.

A record probably unexcelled in the stud pig business in Queensland has recently been established by Messrs. Mat. Porter and Sons of the Roseloch Stud, Wondai, Queensland, with a Berkshire sow purchased for him by the Instructor in Pig Raising at last Sydney Show.

This sow, "Dundas Dora," was bred by Mr. Dawson of the "Dundas" Stud, Dundas, New South Wales, and is now about two years old. She was forward in pig when purchased and farrowed seven very fine pigs soon after arrival in Queensland. She has in the course of her first six months in Queensland put up this fine record:—First Prize, Maryborough Show; First Prize, Childers Show; First Prize, Bundaberg Show; First Prize, Gin Gin Show; First Prize and Reserve Champion, Rockhampton Show; and First Prize and Champion, Gympie Show; where also she was one of the champion group of Berkshire pigs. Her progeny have now also entered the show ring, and have carried off a prize or two.

This sow has done wonders in this time, for travelling first from Sydney Show to Queensland she was out at Wondai a few weeks only before she commenced her show circuit, and was for nearly six months on and off the road journeying to and from the several shows at which she was a competitor.

Mr. Porter has been very successful this year, for in addition to winning the prizes listed, he carried off quite a number of other awards at the several shows at which he exhibited, as well as at Brisbane Show in August, where he purchased a prize-winning sire in "Hillview Lennie" from the stud of Mr. Luke Williams, of Tasmania. Within a month of Brisbane Show "Hillview Lennie" scored First and Champion at the Gympie Show; at which Mat's record included first with sow and litter; first with sow under twelve months old; first and second with sow under six months; second with pen of young boars; Champion Berkshire boar and sow; and Champion Group of Berkshires.

All this constitutes a record of which any breeder might justly be proud.

Mr. Porter, who is one of the most progressive farmers in a district of good farmers, has been breeding stud pigs for a number of years, and has always been high up in the winning lists.

The Necessity for Fallowing.

"The fallowed areas, however, are showing up well." The remark is one that we have heard increasingly frequently of late. Its significance scarcely needs stressing. With large areas and favourable seasons, a few have made fortunes by continuously sowing wheat on stubble land, but a greater number have experienced great hardships with the advent of drought, and the money saved during the years of plenty has disappeared in providing for the necessities of life and in feeding working horses during the lean years. Such is the case when the areas are large. Then how much greater is the chance of failure as the areas become smaller if such a policy is persistently followed?

The aim of the farmer should be, not to chance making a fortune during a few years, but rather to follow a system which will ensure a comfortable yearly income during his life on the farm. To this end, it is well to consider the advisability of following a system of mixed farming—sheep and wheat, in conjunction with a suitable rotation.

Reduction of Fruit Marketing Costs.

According to Mr. A. R. Rule, general manager of the Federated Fruit and Vegetable Growers of America, in a recent address to the American Institute of Co-operation, federation of grower co-operative fruit associations in the United States cut waste in marketing costs by 1,700,000 dollars in the last year, and an additional 2,000,000 dollars were added to the farmers' returns without increasing the consumers' cost.

"Joint national selling is still young," he said, "but successful experience points to a greater pooling of effort in reaching the international markets for perishables."

Co-operative marketing tends to bring about orderly distribution, which in turn tends to stabilise prices, Mr. Rule declared, and added:—"Stability of prices tends to narrower margins of profit by jobbers and retailers. This means lower average cost to consumers. Thus the co-operative movement inevitably reduces the cost of living and justifies the whole-hearted support of consumers.

"I predict that the co-operatives will soon federate their strength in reaching the general public through a powerful advertising campaign, educational in character and telling the true story of co-operative marketing."

What we Learn from Cultural Experiments.

"Looking back over the records of this branch of agricultural experiment work as carried on during the past twenty-five years," writes the Senior Experimentalist of the New South Wales Department of Agriculture on the subject of cultural experiments, "one is struck by the gradual change in the attitude of experimenters generally towards the soil. In the early days the soil was regarded as a more or less constant factor, and tests were mainly devised to test such points as deep *versus* shallow ploughing, mould-board *versus* disc ploughing, harrowing *versus* no harrowing, and so on. It was expected that the results of such trials were capable of fairly general application, and considerable experience, mainly of a negative character, was accumulated from this type of experiment. As knowledge of the various soil types increased, it was realised that different soils required widely different treatments, and that no hard and fast rules could be laid down regarding the operations to be carried out during the important time of preparation for seeding.

"As regards fallowing, for example, in the wheat areas the objective is a weed-free, well-mulched seed-bed, while the soil should be sufficiently consolidated to hold a plentiful supply of moisture within easy reach of the young seedlings. The method of arriving at this desirable condition necessarily varies with different types of soil. Seasonal conditions from year to year also largely determine the time and nature of the cultural operations with a corresponding choice in the type of implement used. The fact that cultural problems are so local in character renders difficult the planning of experiments designed to apply over a wide area. Considerable latitude must be allowed to officers conducting such experiments regarding when and how they carry out the various operations. Results aimed at are of a general nature, capable of as wide an application as possible—in other words, principles are investigated rather than details."

Reclaiming War-Devastated Regions in France.

Queensland farmers who served in France with the A.I.F. will be interested in this:—It is reported that of the 7,250,000 acres of land rendered unsuitable for use at the time of the armistice, 95 per cent. had been restored on the 1st January, 1925. Practically all the land covered with barbed wire entanglements has been cleared, and 97 per cent. of the earth that had been thrown up in making trenches has now been used for filling in. Of the nearly 5,000,000 acres of farm land unsuitable for use at the time of the armistice, 4,525,000 acres had been levelled off.

At the time of the armistice the number of destroyed buildings reached 893,792. On 1st January, 1925, 508,319 of these had been rebuilt. A considerable number of the remaining destroyed buildings will not be re-erected, however, as their owners have accepted war damages with no intention to rebuild.

The number of factories destroyed by the war was 22,900. On 1st January, 1925, 21,000 of these establishments had been rebuilt or repaired, as had over one-half of the 5,081 schools and 3,311 churches that had also been destroyed.

On 31st December, 1924, France had paid out for the restoration of the devastated regions a sum of 74,206,000,000 francs. On the same date the Minister of the Liberated Regions reported that an additional 22,500,000 francs would be necessary to complete this restoration. It is hoped, however, that economies will bring down the latter total to about 18,250,000 francs.

Buying a Separator—It's After Care.

There are few farm machines that are as universally used and abused as the cream separator, points out a writer in the "New Zealand Dairyman." It is by far the most delicate machine the farmer uses, and needs different care and attention from what the average farmer gives it if he would get the years of service that the manufacturers build into it.

The question, "Will it pay me to buy a cream separator?" has rather given place to that other question, "What points should I consider in selecting and purchasing a new separator?" Assuming that all cream separators available for purchase skim equally clean or efficiently when new, and so long as they remain in good mechanical condition, the factors requiring study might be put down in the following order:—

(1) Personal preference or choice based on actual previous experience with one or more makes or types of machine, and the quality of service rendered by the manufacturers and agents in connection therewith.

(2) Proximity of repairs and the kind and duration of service which will probably be given in connection with the various makes of separators being considered.

(3) The quality of material and workmanship, and the simplicity or lack of it which are characteristic of the different makes of machines.

(4) Ease with which a separator may be washed and kept sanitary.

(5) Ease of keeping a machine properly oiled, and ease of assembling and operating.

(6) Capacity, or the number of pounds of milk which can be separated in one hour's time.

After you have bought your cream separator, study the instruction book until you know it by heart, and then follow the instructions that it gives. Here are a few simple rules that, if followed, will save a lot of trouble:—

If the machine turns hard, nine times out of ten it is the oil. Drain out the old oil, clean the bearings, and clean all the sediment out of the oil case; then refill with the best oil you can buy. Don't go to the dealer and call for just separator oil, and let him dump some out of a barrel into a dirty can. Insist on getting the best oil he has in stock, even if it does cost more. It will be cheaper in the long run.

Keep the machine level at all times. More machines are ruined by being set on an unlevel foundation than by all other causes put together. Almost any machine will run well on an unlevel foundation for a short time, but the weight of the bowl will soon wear the spindle and bearings on the one side until the machine is ruined or causes costly repairs to be necessary. As a rule, very little attention is paid to levelling the machine, but no machine made will last as long or run as well on an unlevel foundation as it will where it is set perfectly level.

Start the machine slowly. Take plenty of time starting, as jerking and heaving on the crank is hard on the machine and liable to spring some of the working parts. Run the machine at the speed recommended by the manufacturer. Always use the milk or cream screw to regulate the density of the cream. Never try to regulate the density of the cream by turning slowly or fast or by partly shutting off the flow of milk into the bowl.

Handling Sheep Skins.

Useful points in the handling of sheep skins are conveyed in Bulletin No. 60 (''The Farmer's Clip'') of the Department of Agriculture of Western Australia. The losses through carelessness in this relation in New South Wales justify the following quotation:—

Great care should be taken in removing the skins from the carcass. In skinning a sheep the knife should only be used where absolutely necessary, merely for opening at different points. By using the hand, and punching it against the skin, the latter is separated from the flesh without either making knife cuts or leaving flesh on the skin. As soon as this operation is completed, take the skin and hang it over a rail from neck end to tail, flesh side upwards, allowing the trotters and legs to hang down on either side. When it becomes sufficiently dry in this position, have it painted with an anti-weevil skin paint.

Be sure that the rail over which the skin is hung is underneath a roof, which will protect it from the sun rays or rain. Either of these do material damage and make the pelt useless; therefore, great care should be taken to dry in a shed. When the skins are thoroughly dry, and there are sufficient to make a bundle, fold them exactly opposite from the way they are hung over the rail. This leaves the woolly side outwards. Place these skins on top of each other, tie them up in a bundle, and label them for the broker. The reason for folding them with the wool out is to protect the pelt.

Be sure to cut off the trotters, and fold in any hanging ends, which are easily got hold of by people handling the bundle. If a loose end is left, it is certain it will be used as a handle for lifting, and in nearly every instance the skin will be ripped and torn at that point; therefore, fold the skin so that the bundle is neat and square, showing nothing but wool on the outer side.

Thousands of skins each year have to be valued and treated as damaged just for the want of a little care when they are being removed from the carcass and in process of drying and packing. Damaged skins come under the following headings:— Skins from dead sheep; cut skins; perished skins; weevil-eaten skins; sun-dried skins; any skins exposed to the weather which are shrunk and wrinkled. Faulty skins are ribby skins, and those with seed pricks or seeds piercing through them.

Be careful to leave as little bloodstain as possible on the skin. This all has a tendency to encourage weevil.

Why Potato Varieties "Run Out."

There has for some time been an insistent demand from potato-growers for new varieties to take the place of some of the many old sorts under cultivation, which are frequently said to be ''running out.'' One of the agricultural instructors of the New South Wales Department of Agriculture in the central-western district points out that trials with imported varieties in the last two or three years have not been successful. The direction in which it appears the greatest headway can be made is in improving existing varieties by hill selection—an undertaking which the potato-grower can and should perform.

Increased yields can also be obtained by the employment of a more systematic rotation of crops. The value of organic matter is not sufficiently recognised. In portion of the central-west the pea crop is quite as important as the potato, and these two make an excellent rotation. It is desirable that the potato crop be preceded by a leguminous crop, such as clover or peas, and every endeavour should be made to augment the soil's supply of organic matter. A frequent cause of depleted yields, and the reason for the ''running out'' of varieties, is the haphazard selection of seed for sowing. Continual selection in the barn of the smallest tubers for seed can only lead to a deterioration of the variety. Hill selection in the field when digging is the only safe means of maintaining the vigour and vitality of a variety.

The Care of a Grindstone.

A good grindstone is worth treating properly, and it can be spoilt by ill-usage just the same as any other tool. In the first place, it is necessary to see that it is true (round) before starting to use it, which can be ascertained by laying a bar just clear across the frame and turning slowly—if uneven, it will bump the bar at the full part. If not true, it must be made so; if only a little out, by fixing a heavy piece of iron, or a bar, on the stand, so that the full portions will just grind on it—as they grind down to the true circle, keep shifting the iron up against them again till right. When true the iron will be grinding all the time the stone is turning round. If the stone is very uneven, get a mason to cut it true if not used to working

stone yourself; if you are any good with the tools, mark the true circle from the centre (with two nails in a piece of batten or a nail and a pencil) on each side and chip it out.

The stone true, see that the spindle runs exactly through the centre. This fixed, set it into its stand, which may be carpenter-made, or simply a broad slab squared and set firm and level on two stout blocks in a corner of the workshop. The centre of the slab is, of course, mortised out to let the stone drop in; each side supports its little wheel on which the spindle runs. This spindle is generally cast-iron, and is good enough for ordinary use. The handle, however, should be wrought-iron, as a cast-iron one is too liable to break off short when you are in a hurry.

Always have a flat block of wood on top of the slab, at either end of the stone, just clearing it; this acts as a rest for the tool you are grinding, and makes it less liable to jump or chatter on the stone. This chattering is what makes the stone wear unevenly. An upright should be fixed on which to hang a tin of water, with a little hole plugged loosely with a bit of rag or a dry stick so that there will be a constant trickle on the stone face while grinding.

This is much better than the turner knocking off every now and then to wet the stone, and better for the steel, too. Never, under any circumstances, grind tools dry; it burns the carbon in the steel and ruins it.

Never leave the grindstone exposed to the weather, as heat and cold affect the cementing material and the stone is then spoilt. The top side gets burnt with the sun, or over-wetted by rain and dew, and becomes softer than the bottom, causing the stone to wear out unevenly. If impossible for any reason to have the stone inside, always keep a couple of wheat or corn bags thrown over it to modify the effects of the weather.

If a stone is found to be too hard, or becomes so after being used a little, soak it in the nearest waterhole for a few hours or days as it requires, and then keep it in a cool place afterwards. If a stone is too soft, put it in the sun for a few hours; this will sometimes bring it right, though as a rule soft stones are very hard to fix up satisfactorily.

Nomenclature of Queen Bees.

The following explanations of the terms used in relation to queen bees will be of interest to the beginner in apiculture:—

Ripe Queen Cell.—A cell in which a young queen is being reared in its fourteenth to sixteenth day of development. The virgin usually emerges on the sixteenth day.

Virgin Queen.—An unmated queen from four to six days old.

Drone-laying Queen.—A queen which through any cause has been prevented from leaving the hive on her nuptial flight—usually when five to eight days old—and which starts to lay eggs, all of which produce males.

Exhausted Queen.—An old queen in which the supply of spermatozoa received at mating is spent, indicated by her aged appearance and the development of numbers of drones in worker cells.

Untested Queen.—A purebred queen that has been mated and whose brood consists of both workers and drones. The absolute proof of fertility is not assured until the brood is capped over. When her progeny begins to emerge such a queen may prove to have mated purely or to have mismated.

Mismated Queen.—A purebred queen the markings of whose progeny indicate that she has mated with a drone of a different race, such a queen's drone off-spring are pure, but her workers are hybrids.

Tested Queen.—A queen that has mated with a drone of her own species, indicated by the correct colour marking on the bodies of her progeny.

Select Tested Queen.—A queen that is selected (1) for all-round excellence in quality in herself, *i.e.*, in size, shape, colour, and work, and (2) for correctness of colour marks above and beneath the abdomen in her progeny, showing purity of mating and also evenness of size.

Breeding Queen.—Such a queen has all the characteristics of a select tested queen, but has been kept for one or two years, and has proved the superiority of her progeny by any or all of the following qualities—storing, wintering, building up, stamina, disease resisting, and quietness. A strain is sometimes found with a fixity of character that makes it safe to select breeders at one year old.

Danish Egg-selling Regulations.

Eggs and their containers exported from Denmark are now stamped "Fresh Danish Eggs," "Danish Chipped Eggs," "Danish Eggs, Second Grade," or "Danish Cold-stored Eggs," according to the results of grading. According to the American Agricultural Commissioner at London, the new regulations governing export eggs, hitherto stamped either "New Laid" or "Cold-stored," are effective for three years, beginning 12th June, 1925.

Danish export eggs have borne some distinguishing mark since the organisation of the Danish export co-operatives. It has been thought, however, that the old regulations did not classify the product closely enough. The royal decree announcing the new law stresses the object of raising the quality and reputation of Danish export eggs, and imposes penalties upon exporters for infringements and misrepresentations.

Fur-breeding Industry in the United States.

According to the Department of Markets and Migration, it is reported that 1,000 acres of land to be set aside as a fur-producing centre have been purchased in Michigan, by the Detroit Silver Fox Farms, better known as the Pontiac Strain Organisation, the world's largest fur-producing enterprise. The company already owns, or operates, fifteen farms in several States in America and Canada. This is the first of a group of similar areas that will be established by this company in different sections of the country that are suitable for the raising of different kinds of fur-bearing animals. For almost three years the company has been looking over different tracts of land and has been making a careful research and study of the results of investigations by the United States Bureau of Biological Survey and the Geodetic Survey, as well as of the various State departments of agriculture and of Canada, in addition to a study of the fur markets of the world.

The enormous scale of the new project brings strikingly to the mind the passing of the historic fur-trading organisations whose activities blazed the way for civilisation to follow. In their place are coming gigantic fur-producing organisations that will rival and surpass in magnitude the great fur-trading companies that flourished in the early days of the country and built the first fortunes in America. The new industry of fur-production is closely related to conservation. It is restoring what the fur-trading companies destroyed as they took off the fur bearers and civilisation made their reproduction impossible. The statement issued by the Pontiac Strain Organisation at Detroit continues as follows:—

"Another feature of the new industry is that it will make possible the putting to profitable use great sections of country that are now useless and valueless for any other purpose. In Michigan alone there are thousands of worthless farms that have been abandoned or taken over by the State for taxes. The conservation of our forests and reforestation go hand in hand with conservation of game and fur-bearing animals. This has been the practice of Europe for years and is the policy of the United States Forest Service.

"Private interests that do not feel that they can afford to make the long-time investment required in reforesting vast areas that never will be fitted for agricultural purpose can now do so, and by raising fur-bearing animals realise immediate profits from their investment. Shade is essential to the production of good quality fur, which makes reforestation and fur-production logically go together.

"More than 90 per cent. of the silver fox skins sold on the market are from ranch-raised foxes. The ones that bring the highest prices are from foxes raised in captivity. The reason for this is that the animals are protected and properly fed and the fur taken when prime. Fur becomes prime the same as fruit.

"All kinds of fur-bearing animals will be raised, including mink, marten, muskrat, fisher, beaver, chinchilla rabbits, and karakul sheep. Enormous beds of small fruit will be grown in order that the fruit necessary for priming the fur of the animals will be available for their diet and the surplus will be marketed.

"Thoroughbred cattle, sheep, and pigs will be raised so that in addition to raising breeding stock, milk and meat can be produced to feed the fur-bearers. In other words, nature's great plan in the wilderness will be worked out on a scientific basis by man."

Segregated Cotton Growing—Protecting One-variety Communities from Mixtures.

The importance with which American authorities invest the idea of protecting one-variety cotton communities from the danger of mixture and impairment of seed stocks by careless or irresponsible individuals who would plant a variety other than the one agreed upon by the community, is shown in a recent Californian enactment forbidding practices contrary to general community interests. The advantage of one-variety community cotton production, as long urged by the United States Department of Agriculture, are now so apparent in California that the State Legislature found it necessary to make a law to keep other kinds of cotton seed from being planted in single-variety communities where the farmers have restricted cultivation to the Acala variety.

A recent issue of the "New York Times" (23rd August, 1925) gives prominence to the Californian Act, the purpose of which is to protect the public interest in the improvement of the cotton industry and is regarded by its framers as in line with well established precedents. No extra cost is involved in establishing the one-variety improvement, but only the requirement that growers refrain from injuring their neighbours who have adopted an improved system of production.

As compared with the usual conditions of mixed-variety production, it is claimed that each individual farmer of a one-variety community is able to raise more cotton of better quality, which can be sold at a higher price. Manufacturers are willing to pay more for dependable supplies of uniform fibre because spinning and weaving is less expensive and the resulting fabrics are better. The advantages to be expected eventually through establishing and maintaining a system of community production and marketing of the crop of Acala cotton in the single-variety communities may be estimated conservatively at from 1½d. to 5d. per lb. more than the growers would receive if other varieties were admitted and the usual mixing and mongrelising of the seed stocks took place.

Under the usual conditions of production, with different varieties grown in neighbouring fields and the seed mixed together at the public gins, most of the crop is produced from mongrelised or "gin-run" seed, and the lint is irregular and inferior quality. On account of cross pollination by insects and the construction of the gin machinery, the mixing and deterioration of seed stocks is practically inevitable if different varieties are grown in the same community.

Poisoning of Sheep at Kaimkillenbun—The Darling Pea.

In connection with the recent mortality among sheep at Kaimkillenbun, Mr. J. H. McCarthy, Stock Inspector at Dalby, has submitted specimens of two suspected plants. One specimen is the Darling Pea (*Swainsona galegifolia*), and the other a closely allied species (*Swainsona brachycarpa*). The former is definitely poisonous to sheep, and the latter is a suspected poisonous plant. The Darling Pea is described by the Assistant Botanist, Mr. W. D. Francis, as a perennial of 6 in. to several feet in height with pea-like flowers, varying in colour from white to purplish pink, and with inflated pods 1 to 2 in. long. It is found in coastal and inland parts of the State, and in New South Wales and South Australia. The Darling Pea is one of the few cases of Queensland plants in which a poisonous effect upon animals has been definitely established, and the precise result of the poisonous principle localised in the tissues of affected animals. This exact knowledge is due to the careful invstigations of Professor C. J. Martin, who is also well known by his work on bacterial poisons. Professor Martin's work was carried out in New South Wales in 1896. He found by feeding sheep on Darling Pea that all the symptoms attributed by pastoralists to the ingestion of this plant were reproduced. The symptoms thus reproduced were: Stupidity, followed by stiffness and slight staggering and frequent trembling of the head and limbs, and later by clumsiness, until the animal often falls down. At this stage the action of the animal in running over small obstacles is characteristic, as it jumps over a twig as though it were a foot high. Definite symptoms were produced experimentally in three or four weeks in sheep two or three years old. Sheep were

found to recover if returned to proper food before the symptoms were fully established, but when once the paralytic symptoms were established they did not recover, but remained in much the same condition when proper food was restored to them. Professor Martin was not able to discover with the naked eye anything amiss with the organs of affected animals, but by microscopic means he was able to ascertain that degeneration of the essential part of the nerve fibres near their terminations in skin or muscle took place, and he concluded that this injury was the cause of the symptoms of affected animals. In suggesting preventive measures, he states that pastoralists might take advantage of the fact brought out in the experiments that it takes about a month to produce definite symptoms and arrange their paddocking, so that a flock shall not remain in a Darling Pea infested paddock for a longer period than four to six weeks at a time.

Bunt and Smut—The Use of Carbonate of Copper.

There was evidence throughout the wheat districts visited recently by the Director of Agriculture (Mr. H. C. Quodling) of the presence of "Bunt" (ball smut) also of "Flying Smut." The former is readily overcome by the use of carbonate of copper; the latter is more difficult to eliminate, but can be kept in check by pickling the seed wheat with what is known as the "Jensen Hot Water Method." This is rather a tedious process, but is equally efficacious in dealing with "bunt."

The Department has used carbonate of copper for several years and has not had any smutty crops. To determine the efficacy of this chemical, tests were carried out at the Roma State Farm. This year's trial with infected grain, using at the rate of 1, 1½, and 2 oz. of copper carbonate per bushel gave the following results:—

Untreated, infected seed	87 per cent. smutty
Treated with 1 oz. to the bushel	2 per cent. smutty
Treated with 1½ oz. to the bushel	No smutty plants
Treated with 2 oz. to the bushel	No smutty plants

The seed used throughout was well shaken up with broken "bunt" balls until it was practically black, and a proportion so treated was then pickled with its respective percentage of carbonate of copper and sown immediately afterwards.

The sample of grain used had been bleached by exposure to wet weather in the field and was therefore in a highly susceptible condition.

Wheat Breeding—Mr. Soutter's Work.

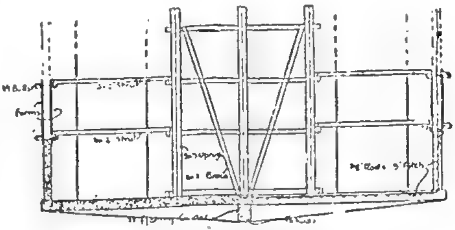
The manager and wheat breeder of the Roma State Farm, Mr. R. E. Soutter, has been engaged for nearly twenty years in the production of new varieties of wheat to suit Queensland conditions. Several of these wheats, notably "Cedric," "Novo," "Roma Red," "Watchman," "Warrior," and "Three Seas" are now to be found in general cultivation. Many crops grown originally from departmental seed were recently inspected to observe the behaviour of each variety and to compare them with standard varieties. Generally, these new wheats are doing well and proving an acquisition. Fully one hundred new crossbreds were tried this year in nursery plots at Allora. Some of these are most promising. Special attention has been given by the breeder, Mr. Soutter, to the cross fertilisation of the more favoured varieties commonly grown here, so that many defects, such as susceptibility to rust and bunt, premature shattering of grain, weakness of straw, lack of constitution, and weakness of flour may be eliminated in the process of evolution associated with the segregation and fixation of desirable unit characters in a new variety.

The carrying on of this work to its logical conclusion must have a most beneficial effect on the industry, and one has only to see the many new and promising strains of wheat at Roma to realise that in a few years the Queensland grower will have wheats represented by crosses between "Florence" and "Gluyas," "Florence" and "Pusa," "Pusa" and "Warren," "Cretan," "Comeback," and "Gluyas," "Florence" and "Warren," and many other combinations calculated to do away with certain weaknesses in the commonly grown varieties which can only be eliminated by careful, painstaking, scientific work.

A CONCRETE TANK.

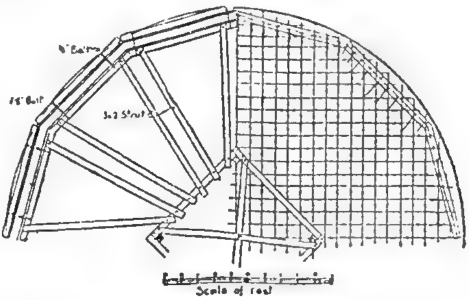
By far the most reliable form of tank either for underground or overhead construction is the reinforced concrete type. It possesses the one big drawback in its construction that unless a good deal of ingenuity is used, the cost of the forms will exceed the actual cost of the tank. If a number of tanks could be constructed in a circumscribed area, using the one set of forms, the cost could be distributed, and so be only a small proportion of the value of each tank. Communal arrangements such as this, however, are not likely to be entered into, so that if a man wishes to construct a concrete tank he must design forms as cheap as possible, and likely to be of some use as second hand material when the job is complete.

In the method of construction here illustrated, for the sake of economy the true circular type gives place to a multi-sided tank, 12-sided to be exact. Each section of forms can thus be built up straight. The cheapest material at present procurable for making the form is that provided by motor car cases, which are fashioned of tongued and grooved boards. Failing that, a cheap grade of flooring can be used. All the rest of the timber is straight 3 by 2 and 3 by 3 oregon, all of which should be useful on a farm later on. A complete set of forms, inside and outside, for once around the tank will be required. The walls will be constructed in a series of ''lifts,'' the height of which will depend on the material used in the form. Three feet is a good average to aim for. The diameter of the tank having been decided upon, the whole job should be set out full size on the ground, and the actual dimensions for struts, &c., taken from this set out, also the size of the shutters for the forms.



METHOD OF STRUTTING.

The forms are strutted and held in place by means of arms radiating to the forms from a central square tower, which must be built up true and plumb, and well braced, and provided with horizontal pieces at heights that will correspond with the heights of the forms. The construction of the tower and the arms is shown in the drawing. The tower may be bolted to one or two bolts built into the base of the tank, and afterwards cut off flush before the rendering is done. In the upper drawing the forms are represented as being in position for the second lift. They will be resting on bolts passing through the boards and resting on top of the concrete, and which can be pulled out while the concrete is still green. The inner and outer forms must be kept apart at the required distance by means of blocks, which must be removed as the concrete comes up to them. For additional security each adjacent pair of radial struts may be lashed together near the circumference. In unshipping the forms a little difficulty will be met with in getting out the first inner section. This can be obviated by making the last shutter slightly smaller and filling the aperture with a vertical strip tacked in position. Care must be taken not to jar the concrete when removing the forms.



THE BOTTOM.

The whole of the tank can be built of a six to one concrete. Good river gravel makes a splendid aggregate, but all large pebbles should be cracked small. The bottom here shown is strengthened by means of two cross girders formed in trenches cut in the earth, and reinforced with rods as shown. The mat for the bottom must be made before the concreting commences, and small upright pieces fastened around the circumference to which can be tied the vertical wall reinforcements later on. The thickness of walls recommended is four to five inches. All ends of rods should be hooked. The horizontal wall reinforcements for each lift can be put in as the work rises. Care must be taken that the reinforcement does not come too close to the outside of the wall. The pitch here shown is 9 inches throughout, the finer niceties of design in the spacing of reinforcements having been disregarded. Three-eighths rods may be used throughout (¼-inch for the smaller tanks), and 22-gauge soft wire for tying at intersections.

Explanation of Drawing.

The upper drawing shows a section of the tank with bottom laid, and one lift of walls completed. The forms are in position for the second lift. Positions of reinforcements are shown on the right-hand half. The left-hand portion of the lower drawing (which is a half-plan) shows the forms in position for filling, while the right-hand portion shows the method of reinforcing the bottom and sides.

Filling.

Care should be taken in filling the forms to get the concrete as dense as possible, ramming it down each side of the rods with a stick. Concrete must not be too wet, but it must be soft enough to flow easily around the rods. Always do the whole of one lift all round the tank in one operation. Before putting new concrete on top of old always brush over the old with a slurry of neat cement and water. Keep all the work damp, covered with wet bags as long as possible. The tank should be rendered both inside and out with a cement mortar of two parts of sand to one of cement, trowelled hard to a smooth finish.—"Adelaide Chronicle."

A PORTABLE FOWLHOUSE.

A reader has asked for sketch plans of the portable poultry-house, a model of which accompanied the Better Farming Train. This colony poultry-house, devised by Mr. W. C. Rugg, poultry expert of the Department of Agriculture (Victoria), is

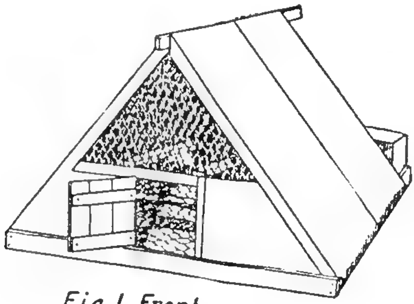


Fig. I. Front

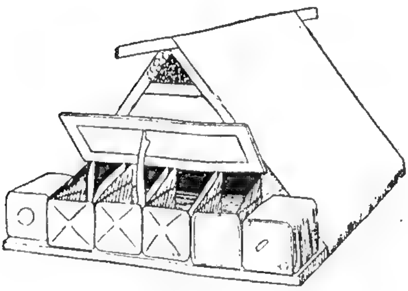
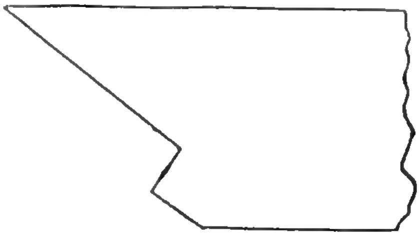


Fig 2 Back.

6 feet by 5 feet, 4 feet high, built in the shape of a tent, and will accommodate 50 chickens 10 to 12 weeks old, for from six to eight weeks, when the number should be thinned down. The house can be conveniently used for laying hens after the



. Fig. 3. Top.

chicken season is over, and will accommodate from 20 to 24 layers. Portion of the back of the house being hinged can be lifted up, and four nests made from kerosene tins, cut as directed, can be fitted in. The entrance to the nests is from inside the house, so that the hinged portion forms the lid to the nests, and can be lifted

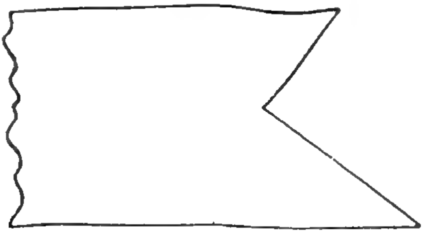


Fig 4 Sottom

when the eggs are being gathered. The width of the back of the house allows space for six kerosene tins—four nest-boxes, one water-tin, and one with separate spaces for shell grit and charcoal. These tins all rest on the frame of the house, and can be lifted with it. The whole building is very light, but stiff and strong. It is very advisable to make a floor with a frame of 2 by 1 battens on edge, over which wire-netting is tightly stretched. This keeps the birds dry in wet weather, and prevents the hens carrying dirt into the nests. These houses are recommended for use in the

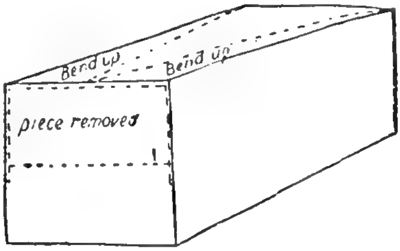


Fig 5. Kero. tin for nests

orchard. Movable hurdles are used to make a small enclosure round the house until the birds get accustomed to it. Five hurdles 10 feet by 3 feet of 2 inch by 1 inch hardwood, covered with wire-netting, will be enough to keep in young birds. The material required for the house is as follows:—Two pieces of 3 by 1 hardwood, 7 feet 2 inches for the bottom length; two pieces of 3 by 1 hardwood, 4 feet 10 inches for the bottom width; one piece of 2 by 1 hardwood, 5 feet for the bottom width at end; six pieces of 2 by 1 hardwood, 4 feet for sides of roof; one piece of 2 by 1

hardwood, 8 feet for ridge; two pieces of 2 by 1 hardwood, 3 feet for perches to rest on; one piece of 2 by 1 hardwood, 3 feet 4 inches to hinge nest lid to; one piece of 2 by 1 hardwood, 1 foot 4 inches for ventilator at back; two pieces of 2 by 1 hardwood, 1 foot 3 inches for door frame; two pieces of 2 by 1 hardwood, 5 feet 10 inches for perches; one door, 1 foot square; six pieces No. 14 gauge wire, 8 feet 6 inches to support ruberoid; two pieces No. 2 ply ruberoid 8 feet 4 inches for roof. For front—One kerosene tin flattened out and cut in half—half to cover in each side of door; one pair of 1½ inch butt hinges; one piece of wire-netting, triangle shaped (3 feet at base, 2 feet to peak). For back—One kerosene tin and a-half flattened out—one above the nest-boxes and a quarter on each side of them; one piece of tin, 3 feet 3 inches by 1 foot 3 inches (cover for nests); one pair butt hinges, 1½ inches for cover; one piece of wire-netting for ventilator, 1 foot at base, 8 inches to peak; four kerosene tins for nests; one kerosene tin for water; one kerosene tin for shell grit and charcoal. For floor frame—Two pieces 2 by 1 hardwood, 5 feet 7 inches; four pieces 2 by 1 hardwood, 4 feet 7 inches; one piece wire-netting, 5 feet 7 inches by 4 feet 7 inches, 1½ inch mesh. The 5 feet of 2 by 1

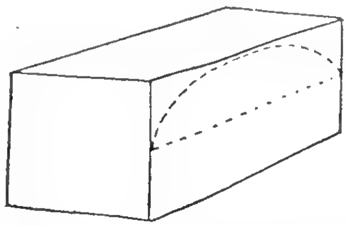


Fig 6. Kero tin for water also shell grit and charcoal

cross piece at the bottom is checked into the 7 feet 2 inches pieces on the underneath side at the back, and forms the rest for the nests. One 4 feet 10 inches cross piece is 14 inches from this, and the other is at the front end. The end pieces for sides of roof are cut as shown in figures 3 and 4, but the two middle pieces are cut on the flat. The 8 feet ridge pole projects 18 inches at the back and 6 inches in front, which is handy for moving the house. The kerosene tins are cut as shown by the dotted lines, figures 5 and 6. At the front of the nest tins cuts 2 inches long are made, and the piece of tin is bent over the 3 by 1 batten or the bottom frame of the house, the back resting on the 2 inch by 1 inch piece of timber. The remainder of the details can be understood from the sketch plans.—"The Australasian."

A SHEEP DRENCHER FOR STOMACH WORMS.

This is a labour-saving device for dealing with worms in sheep, and has been designed on suggestions made by an experienced sheep station manager who has had many years' experience in dealing with worm-infested sheep in Queensland.

The old style was to measure separate doses of the drenching liquid into sauce bottles or metal measures. This drencher does the measuring automatically, delivering any sized dose required, and the operator carries the liquid in a knapsack container strapped on the shoulder, and this is connected with the hand-piece by rubber tubing, so that one man can now do the work quickly and efficiently that took two men with the old style of hand measuring, and with the certainty that each dose is uniform in quantity.

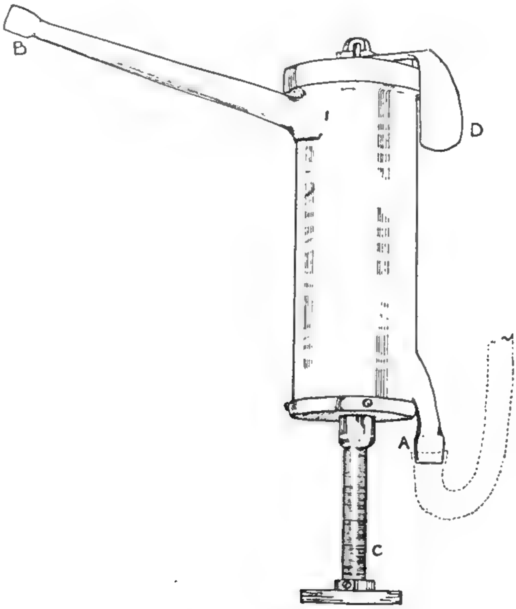
In drenching large mobs of sheep a saving of at least 50 per cent. of labour can be made by using this drencher. The drencher can also be used by connection with a small tank above the level of the operator, who then only carries the hand-piece with the connecting rubber tube.

Set drencher to desired dose by adjusting the marked screw C at bottom or hand-piece and testing dose by graduated glass supplied, to make certain that proper amount is being delivered.

To fill measure hold hand-piece in vertical position below the level of the bottom of the knapsack container or reservoir, with the thumb lever D pushed back to the right as far as possible (holding the hand-piece in the right hand).

To administer the dose the operator holds the sheep between his legs on four feet and inserts the discharge pipe into the mouth of the sheep and at the same time pushes the thumb lever D to the left as far as possible, and this allows the dose to flow into the sheep's mouth at a rate which the sheep can swallow safely.

To ensure that each sheep only gets one dose, it is advisable for the operator to carry a stick of raddle and mark each sheep as treated. This applies to one-man drenching; in large yards the more economical method would be to pass each sheep out of the pen as drenched and have catchers to bring the sheep up to the operators.



DIRECTIONS FOR USE.

A recipe which has stood the test of time for stomach worms in sheep for many years on the Darling Downs is made as follows:—

Take 4 oz. of full strength arsenic and 14 lb. of epsom salts, boil for half an hour in a 10-gallon drum with 5 gallons of water, stirring continually while boiling. (Keep cold water handy to add if the mixture starts to boil over.) Then fill drum to 10-gallon mark and the mixture is ready for use as soon as it cools down.

Dose as follows:—

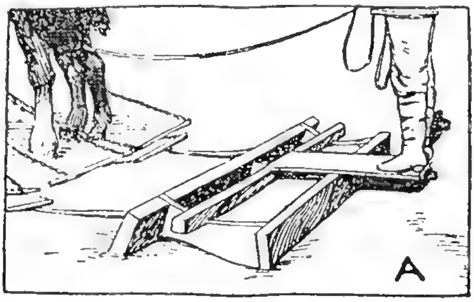
Lambs 3 to 4 months old	1 oz.
Lambs 4 to 6 months old	$1\frac{1}{4}$ oz.
Lambs 6 to 9 months old	$1\frac{1}{2}$ oz.
Lambs 9 to 12 months old	$1\frac{3}{4}$ oz.
Dry ewes and wethers	2 oz.
Ewes rearing lambs	$2\frac{1}{4}$ oz.
Grown sheep badly affected	$2\frac{1}{2}$ oz.

Yard sheep for twelve to fifteen hours before drenching, and keep in yards for three or four hours after drenching (without access to water). If sheep are starving when yarded then drench at once.

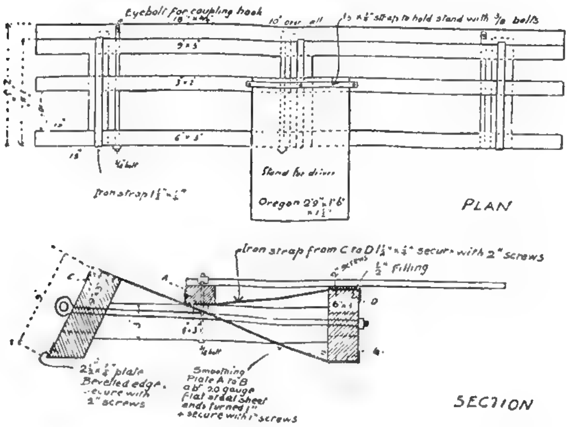
To diagnose stomach worms in sheep:—Examine whites of eyes; if no small veins visible and if appearance of face is white and skin under wool on body shows white as though there were no blood, this is an indication of stomach worms. Badly affected sheep will show "bottle jaw" and a wormy sheep will, as a rule, lie down and sulk if run for a few yards. To make certain, if in doubt, kill a sheep and examine fourth stomach, where the worms will be found.

AN EFFECTIVE LAND LEVELLER AND SMOOTHER.

The implement can be made any length convenient up to 12 feet. The steel smoothing plate should be of 10 gauge, although 20 gauge may be used if the amount of work in view is not very great. It is brought from the middle 3 by 2 beam to the underneath of the back 6 by 3 beam, and holes are cut in it for the ties and bolts. In use the driver, standing on the plates, by moving forward causes



INEXPENSIVE AND EFFECTIVE LAND SMOOTHER



the front beam, with its cutting edge, to enter the ground and carry forward any dirt cut off, and by moving backward he raises the front, thus allowing the accumulated earth to pass under in as great or as small quantity as he pleases. while the sloping steel sheet smoothes it out, crushes the lumps, and spreads it in any depressions.—Water Supply Commission of Victoria.—"Melbourne Weekly Times."

PLATE 171.—IN THE COTTON BELT—TYPICAL VIRGIN FOREST COUNTRY IN THE BURNETT-DAWSON REGION.

(*See* letterpress, p. 523.)

PLATE 172.—FIRST FURROWS ON VIRGIN LANDS—IN THE COTTON BELT, BURNETT-DAWSON COUNTRY.

(*See* letterpress, p. 523.)

Answers to Correspondents.

Hog Lice.

A.S. (Bylong).—

The Instructor in Pig Raising, Mr. Shelton, advises that the best remedy for pigs suffering from hog lice or other skin parasites is to apply liberally the mixture:—Benzine, ½ pint; kerosene, ½ pint; fish oil, 7 pints. Apply by hand, with a soft cloth, sponge, or brush, after the pigs have been well washed. Keep the mixture well corked in a tin or glass container. If fish oil is not available any cheap grade of vegetable oil would do, such as raw linseed oil, crude castor oil; or a mineral oil, such as old motor oil, separator, or machine oil. As the eggs (nits) deposited by the female louse hatch in about three days after being laid, the mixture should be applied a second time about one week after first application, then again in about two or three weeks, or as required. Very young pigs are frequently very heavily infested with lice, and the irritation due to their presence checks growth. A favourite resort for lice is inside the ear and in other more or less inaccessible parts where they cannot be rubbed off. On large runs automatic hog oilers are worth while.

White Scour in Young Pigs.

W.D. (Woolooga)—

White scour in young pigs is a complaint almost entirely due to overfeeding of the sow at this particular time. The boar may be at fault, for some sires produce progeny which are bad doers right from the start. If you think this is the case Mr. Shelton advises that he should be culled immediately and replaced with a more active, vigorous, unrelated sire. The fact that when the sows are fed with dry corn the trouble is not so severe seems to indicate that overfeeding is the cause, for where sows are feeding on dry corn they do not consume so much bulk, and dry corn is not such a heavy milk producing food as skim milk and similar foods.

Ensilage for Pigs—Shelter Shed—Grasses.

E.B. (Biggenden)—

The Instructor in Pig Raising, Mr. Shelton, advises that (1) Ensilage is a very useful food, particularly for breeding sows, especially when it consists of green corn stalks chaffed when the cobs are in the milky stage. Grain sorghums also provide an abundant supply of nutritious grain and these are useful drought-resisting crops which should be grown more extensively. They can if required be converted into ensilage, but give better results from the grain. Ensilage is not so useful for very young pigs. Ensilage, however, is such an excellent food for dairy cattle that few farmers will spare any for their pigs except it be the musty, mouldy stuff from the top or sides of the stack or pit, which should be burned or ploughed in instead of being used for pig feed. Nevertheless ensilage is one of the "stand-by" foods you can rely upon. Sugar-cane and improved cow cane are both very useful crops which can stand over from one season to another if desired as also is arrowroot, a very reliable root crop.

Where soil and climatic conditions suit, sweet potatoes can be grown to considerable advantage, while Jerusalem artichokes stand quite a lot of dry weather. Lucerne hay can also be used, moistening or soaking same for the first few days until the pigs become accustomed to it.

It is difficult to educate farmers up to the necessity for conserving fodder and grain for dry spells, most farmers appearing to prefer to take the risk, especially when grain crops like maize rise in value to around 5s. per bushel. Where corn can be grown to advantage and can be conserved in the form of grain in tanks it is perhaps the most reliable stand-over cereal grain we have, though both wheat and English or Skinless barley can also be used. We know all too little of the value of crushed barley as a food; it is the grain *par excellence* in the old land.

(2) Your suggestions *re* shelter shed are practical and valuable. If you decide on constructing a shelter shed of the type referred to we would appreciate a clear photograph of it, both before the roof goes on and when the shed is complete.

(3) Rhodes grass grows very rank and soon becomes coarse and fibrous, it is nevertheless a hardly drought-resisting grass which in the earlier stages of growth has a good feeding value. Pigs prefer grasses such as paspalum, couch, or Kikuyu. All these are much more succulent than Rhodes. Kikuyu seems to be of great value though it would suffer considerably in very dry seasons, but Rhodes would make little growth during dry spells, and it would be worth while trying Kikuyu.

Ailing Boar.

F.W. (Dalma Scrub)—

The Instructor in Pig Raising (Mr. Shelton) advises:—Reduce the allowance of green corn or of grain, and give the animal plenty of green food and clean drinking water. If you could feed some soaked cowpeas it would be effective in freshening him up, and we would suggest doubling the dose of Epsom salts and giving him this medicine twice a week for three weeks, after which the dose could be reduced to normal; also keep him away from the sows altogether during treatment and only place them together again when one or other of the sows is actually ready for service. Compulsory and, if necessary, vigorous exercise is sometimes necessary in inducing activity in young boars, while in obstinate cases it has been found necessary to enclose the sow in a breeding race during service. Both male and female should be kept in normal breeding condition.

Selecting a Poland-China Boar—Prolific Sows.

H.D.S. (Cecil Plains)—

Mr. Shelton advises:—Much of course depends upon the animal himself, for after all prolificacy is only one of the many valuable characteristics of pigs. Poland-China sows would not in a general way average more than nine pigs per litter nor have we any other breed that could be relied upon to produce and rear (this is important also) more than nine pigs per litter. Our advice, therefore, is, that as long as the animal is otherwise of good quality and is growthy and vigorous, to go ahead with the purchase but do not use the boar for stud purposes before he is ten months old, otherwise he will become stunted and will have a shorter life. We met with an instance a few days ago in which a Brisbane show purchase, a Poland-China sow, produced eleven pigs in her first litter, nine boars and two sows. These were all very well-developed pigs of excellent quality and type. Nevertheless it is not every sow that is as prolific as this. Care and attention count for much in the handling of pigs of all descriptions.

Loss of Sow.

J.B. (Mutdapilly)—

The Instructor in Pig Raising, Mr. Shelton, advises:—It is extremely difficult from the information supplied to diagnose definitely the complaint from which your sow died. Possibly, she suffered from acute constipation, for that is one of the commonest and most serious causes of death among pigs that are housed and fed on most of our farms. Whether this was the cause of the trouble cannot be said, for you make no reference to the condition of the animal's bowels. The foot injury may have been the cause, and tetanus germs may have entered where the skin was broken; for pigs, like all other animals, are occasionally affected by this peculiar and rapidly fatal disease, in which the paralysis and twitching of muscles are very common symptoms. There is no cure for tetanus when it develops to the extent referred to, for it is rapidly fatal, the animal suffering intense agony for a few hours before death. Then food poisoning is a possible cause, this frequently resulting through the animal drinking corned beef water, the water in which salted meat has been cooked, or through consuming some other poisonous material, musty or mouldy grain, &c., which cause severe abdominal pain (colic). Then, again, diarrhoea or white scour is a common trouble among pigs, a trouble responsible for the the death of thousands of young pigs every year. This usually commences while the animal is very young, and develops into an acute form about weaning age.

Allow your pigs a good large run and give them ample green food. Be careful in using cob corn in the milky stage, for this sometimes causes scouring in very young pigs. It was considered for many years to be one of the primary causes for the huge losses of young pigs in America during the period when they suffered so heavily from swine fever (hog cholera).

Feeding Pigs.

H.F.R. (Kenilworth)—

Mr. Shelton's opinion is that in feeding maize to pigs it pays handsomely to grind the maize to a meal and then either soak or cook it for the pigs, though it must be admitted that experiments have indicated that there is not a wide margin to allow for expense (fuel, labour, &c.) between results obtained from feeding maize uncooked *versus* cooked. Much depends upon the class of pig handled and upon local farm conditions. For instance, the American people advocate allowing the pig to do its own harvesting by turning it into the maize crop and allowing in addition free range over succulent pasture. Our conditions are somewhat different, for our most popular bacon pig is one ready for the market at five and a-half to six months of age. These pigs would not benefit to the same extent by being turned out in large corn paddocks. We find it pays much better to keep the bacon pigs in acre or so pig paddocks and to hand feed and thus hurry them on. Breeding sows (and the boar if convenient) benefit very largely by having larger pig paddocks. Under your conditions a system allowing for a little of each of the above would pay, that is allowing the pigs to run for a month or six weeks prior to their reaching the fattening stage, and then to bring them into close range and finally to top up on grain and milk for several weeks before marketing. In this case it would certainly pay you to grind and either soak or soften the meal by cooking. In this system you could also work in your potatoes, for it certainly pays to cook potatoes, and using them as a mash with maize meal would be a good idea.

M.C. (Toogooloowah)—

In the absence of skim milk, root crops and grain make excellent substitutes, while it is necessary to have ample supplies of green stuff, lucerne, grasses, &c., especially for the breeding stock and young pigs. Of the root crops you will find that sweet potatoes are the most payable, while Jerusalem artichokes, arrowroot, and mangel wurzels are ideal foods. We recommend your taking this Journal regularly. It costs but one shilling per annum, which represents the postage on twelve issues. It carries, as you will see, a great deal of useful information, is well illustrated, and would be a useful addition to your farm literature.

J.A.W. (Goomboorian)—

For your purpose we consider paspalum grass has many advantages from a pig-feeding standpoint. In the Maleny district giving kikuyu grass is being tried and it is proving very satisfactory, as also is couch, white clover, &c. Burseem or Egyptian clover is a useful plant, too, but requires better soil than most of the others to secure best results. It will pay handsomely to grow maize, cowpeas, and field peas. In root crops sweet potaoes are the best, though Jerusalem artichokes also pay well. Mr. Shelton suggests cutting out swede turnips as they are not a payable pig crop, but mangel wurzels pay and are an excellent standover crop, as also is arrowroot. Improved cow cane and the softer varieties of sugar-cane are excellent, as also are saccaline and other sweet sorghums.

The Instructor in Pig Raising will willingly assist in the matter of the selection of breeding stock, and if you let him know your requirements he would be able to obtain prices at which suitable stock may be bought.

MARKET FOR TOMATOES IN JAVA.

By the courtesy of the Department of Markets and Migration, we have received a copy of a letter from H.B.M. Commercial Agent for the Netherlands East Indies, Batavia, concerning the market for tomatoes in Java. The Commercial Agent states that "though considerable quantities of tomatoes are grown in Java, there is a shortage of the locally grown product during the months extending from September to April. From October to March, in fact, tomatoes are almost unobtainable here. It would thus appear that there should be a fair market in the Netherlands East Indies for Australian-grown tomatoes during at least six months of the year. The period of transit from Geraldton to Batavia is eleven days, or two days less than from Geraldton to Melbourne, and if the tomatoes are properly packed, it should be possible to land them here in good condition." The foregoing suggests that there might be some business in this for North Queensland growers.

Farm and Garden Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole. Early-sown cotton will be in bloom.

As the regular wet season is expected to commence this month, provision should be made accordingly.

On coastal and intercoastal scrub districts, where recently burnt-off scrub lands are ready for the reception of seed of summer-growing grasses, sowing may commence as soon as suitable weather is experienced. Much disappointment may be saved, and subsequent expenditure obviated, by ensuring that only good germinable grass seed is sown, of kinds and in quantities to suit local conditions, the circumstance being kept in mind that a good stand of grass is the principal factor in keeping down weeds and undergrowth.

In all districts where wheat, barley, oats, canary seed, and similar crops have recently been harvested, the practice of breaking up the surface soil on the cropped areas should invariably be adopted. Soil put into fit condition in this way will "trap" moisture and admit of the rains percolating into the subsoil, where the moisture necessary for the production of a succeeding crop can be held, provided attention is given to the maintenance of a surface mulch, and to the removal, by regular cultivation, of volunteer growths of all kinds. If not already seen to, all harvesting machinery should be put under cover, overhauled, and the woodwork painted where required.

Where maize and all summer-growing "hoed" crops are not too far advanced for the purpose, they should be kept in a well-cultivated condition with the horse hoe. Young maize and sorghum crops will derive much benefit by harrowing them, in the same direction as the rows are running, using light lever harrows with the tynes set back at an angle to obviate dragging out of plants, but the work should not be done in the heat of the day.

Quick-maturing varieties of maize and sorghum may still be sown in the early part of the month in coastal areas where early frosts are not expected.

Succession sowings may be made of a number of quick-growing summer fodder crops—Sudan grass, Japanese and French millet, white panicum, and liberty millet (panicum). In favourable situations, both "grain" and "saccharine" sorghums may still be sown; also maize, for fodder purposes.

Fodder conservation should be the aim of everyone who derives a living from stock, particularly the dairyman; the present is an important period to plan cropping arrangements. Exclusive of the main crops for feeding-off (when fodder is suitable for this purpose), ample provision should be made for ensilage crops to be conserved in silo or stack. As natural and summer-growing artificial grasses may be expected to lose some of their succulence in autumn, and more of it in winter and early spring, the cropping "lay-out" to provide a continuity of succulent green fodder throughout the season calls for thorough and deep cultivation and the building up of the fertility and moisture-holding capacity of the soil. Planter's friend (sorghum) may be sown as a broadcast crop at the latter end of the month for cutting and feeding to cattle in the autumn and early winter. Strips of land should be prepared also for a succession sowing about the second week in February, and for winter-growing fodder crops.

KITCHEN GARDEN.—A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in a covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass,

or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Tur over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflower, mustard, cabbage, celery, radish for autumn and winter use. Sow celery in shallow well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

FLOWER GARDEN.—To make the flower-beds gay and attractive during the autumn and winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost; then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle, lift them gently one by one with a knife or a zinc label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Keep a sharp lookout for slugs and caterpillars.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over-water at this season. Propagate verbenas, not forgetting to include the large scarlet Foxhunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed-boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in autumn and winter will present a charming sight.

Orchard Notes for January.

THE COASTAL DISTRICTS.

All orchards, plantations, and vineyards should be kept well cultivated and free from weed growth; in the first place, to conserve the moisture in the soil, so necessary for the proper development of all fruit trees and vines; and, secondly, to have any weed growth well in hand before the regular wet season commences. This advice is especially applicable to citrus orchards, which frequently suffer from lack of moisture at this period of the year if the weather is at all dry, and the young crop of fruit on the trees is injured to a greater or less extent in consequence.

Pineapple plantations must also be kept well worked and free from weeds, as when the harvesting of the main summer crop takes place later on, there is little time to devote to cultivation. If this important work has been neglected, not only does the actual crop of fruit on the plants suffer, but the plants themselves receive a setback.

Banana plantations should be kept well worked, and where the soil is likely to wash badly, or there is a deficiency of humus, a green crop for manuring may be planted. Should the normal wet season set in, it will then soon cover the ground without injury to the banana plants. When necessary, banana plantations should be manured now, using a complete manure rich in potash and nitrogen. Pineapples may also be manured, using a composition rich in potash and nitrogen, but containing no acid phosphate (superphosphate) and only a small percentage of bone meal, ground

phosphatic rock, or other material containing phosphoric acid in a slowly available form.

Bananas and pineapples may still be planted, though it is somewhat late for the former in the more southern parts of the State. Keep a good lookout for pests of all kinds, such as Maori on citrus trees, scale insects of all kinds, all leaf-eating insects, borers, and fungus pests generally, using the remedies recommended in Departmental publications.

Fruit fly should receive special attention, and on no account should infested fruit of any kind be allowed to lie about on the ground to become the means of breeding this serious pest. If this is neglected, when the main mango crop in the South and the early ripening citrus fruits are ready, there will be an army of flies waiting to destroy them.

Be very careful in the handling and marketing of all kinds of fruit, as it soon spoils in hot weather, even when given the most careful treatment. Further, as during January there is generally more or less of a glut of fresh fruit, only the best will meet with a ready sale at a satisfactory price.

Grapes are in full season, both in the Brisbane and Coominya districts, and in order that they may be sold to advantage they must be very carefully handled, graded, and packed, as their value depends very much on the condition in which they reach the market and open up for sale. Well-coloured fruit, with the bloom on and without a blemish, always sells well, whereas badly coloured, immature, or bruised fruit is hard to quit.

One of the greatest mistakes in marketing grapes is to send the fruit to market before it is properly ripe, and there is no better way to spoil its sale than to try and force it on the general public when it is sour and unfit to eat.

Bananas for sending to the Southern States require to be cut on the green side, but not when they are so immature as to be only partially filled. The fruit must be well filled but show no sign of ripening; it must be carefully graded and packed and the cases marked in accordance with the regulations under the Fruit Cases Acts and forwarded to its destination with as little delay as possible.

Pineapples should be packed when they are fully developed, which means that they contain sufficient sugar to enable the fruit to mature properly. Immature fruit must not be marketed, and if an attempt is made to do so the fruit is liable to seizure and the sender of the fruit to prosecution under the abovenamed regulations. Further, the fruit must be graded to size and the number of fruit contained in a case must be marked thereon. Immature fruit must not be sent. For canning, the fruit should be partly coloured; immature fruit is useless; and overripe fruit is just as bad. The former is deficient in colour and flavour and the latter is "winey" and of poor texture, so that it will not stand the necessary preparation and cooking.

Should there be a glut of bananas, growers are advised to try and convert any thoroughly ripe fruit into banana figs.

The fruit must be thoroughly ripe, so that it will peel easily, and it should be laid in a single layer on wooden trays and placed in the sun to dry. If the weather is settled, there is little trouble, but if there is any sign of rain the trays must be stacked till the weather is again fine, and the top of the stack protected from the rain. To facilitate drying, the fruit may be cut in half lengthways. It should be dried till a small portion rubbed between the finger and thumb shows no sign of moisture. It can be placed in a suitable box to sweat for a few days, after which it can be dipped in boiling water to destroy any moth or insect eggs that may have been laid on it during the process of drying and sweating. It is then placed in the sun to dry off any moisture, and when quite dry it should be at once packed into tight boxes lined with clean white paper. It must be firmly packed, when, if it has been properly dried, it will keep a considerable time. It can be used in many ways, and forms an excellent substitute for raisins, sultanas, currants, or other dried fruits used in making fruit cakes and other comestibles. Banana figs will be found useful for home consumption, and it is possible that a trade may be built up that will absorb a quantity of fruit that would otherwise go to waste.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Granite Belt, and orchardists are fully occupied gathering, packing, and marketing the crop of midseason fruits, consisting of plums of several kinds, peaches, nectarines, pears, and apples. The majority of these fruits are better keepers and carriers than those that ripen earlier in the season;

at the same time, the period of usefulness of any particular fruit is very limited, and it must be marketed and disposed of with as little delay as possible.

With the great increase in production, owing to the large area of new orchards coming into bearing and the increasing yields of those orchards that have not come into full profit, there is not likely to be any market for immature or inferior fruit. There will be ample good fruit to fully supply the markets that are available and accessible. Much of the fruit will not carry much beyond the metropolitan market, but firm-fleshed plums, clingstone peaches, and good firm apples should stand the journey to the Central, and, if they are very carefully selected, handled in a manner to prevent any bruising, and properly graded and packed, they should carry as far as Townsville. Growers must remember that, given a market fully supplied with fruit, only such fruit as reaches that market in first-class condition is likely to bring a price that will pay them; consequently the grower who takes the trouble to send nothing but perfect fruit, to grade it for size and colour, to pack it carefully and honestly, placing only one sized fruit, of even quantity and even colour, in a case and packing it so that it will carry without bruising, and, when opened up for sale, will show off to the best advantage, is pretty certain of making good. On the other hand, the careless grower who sends inferior, badly graded, or badly packed fruit is very likely to find when the returns for the sale of his fruit are to hand, that after paying expenses there is little, if anything, left. The expense of marketing the fruit is practically the same in both cases.

Then "why spoil the ship for the ha'p'orth of tar" after you have gone to the expense of pruning, spraying, manuring, and cultivating your orchard? Why not try and get a maximum return for your labour by marketing your fruit properly? The packing of all kinds of fruit is a fairly simple matter, provided you will remember—

(1) That the fruit must be fully developed, but yet quite firm when gathered.

(2) That it must be handled like eggs, as a bruised fruit is a spoilt fruit, and, when packed with sound fruit, spoils them also.

(3) That only one-sized fruit, of an even degree of ripeness and colour, must be packed in a case.

(4) That the fruit must be so packed that it will not shift, for if it is loosely packed it will be so bruised when it reaches its destination that it will be of little value. At the same time, it must not be packed so tightly as to crush the fruit.

If these simple rules are borne in mind, growers will find that much of the blame they frequently attribute to the fruit merchants or middlemen is actually the result of their own lack of care. Fruit that opens up in the pink of condition sells itself, whereas any fruit that opens up indifferently is hard to sell on any except a bare market, and on a glutted market is either unsaleable or realises such a poor price that the grower is frequently out of pocket and would have been better off had he not attempted to market it.

If spraying with arsenate of lead, and systematic bandaging, has been properly carried out, there will be comparatively few codlin moths to destroy the later ripening pip fruits; but if these essential operations have been neglected or carelessly carried out, a number of moths will hatch out and the eggs laid by them will turn to larvæ that will do much damage, in some cases even more than that caused by the first broods that attack the fruit as soon as it is formed. Where there is any likelihood, therefore, of a late crop of moths, spraying with arsenate of lead must be continued if the late crop of pip fruits is to be kept free from this serious pest.

Fruit fly must be systematically fought, and on no account must any fly-infected fruit be allowed to lie about on the ground and breed this pest, to do further damage to the later ripening fruits.

Citrus orchards will need to be kept well cultivated in the drier and warmer parts of the State, and, where necessary, the trees should be irrigated. If scale insects are present, the trees should be either sprayed, or, better still, treated with hydrocyanic acid gas.

Western grapes are in full season, and if they are to be sent long distances by rail, then they are all the better to be cut some hours before they are packed, as this tends to wilt the stems and keep the berries from falling off in transit. The fruit must be perfectly dry when packed, and should be as cool as possible. It must be firmly packed, as a slack-packed case always carries badly and the fruit opens up in a more or less bruised condition.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. K. CHAPMAN.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

1925.	November.		December.		Moonrise. Nov.	Moonrise. Dec.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	5·3	6·9	4·50	6·32	6·35	7·16
2	5·2	6·10	4·50	6·32	7·32	8·9
3	5·1	6·11	4·50	6·33	8·29	8·59
4	5·0	6·11	4·50	6·34	9·25	9·45
5	5·0	6·12	4·50	6·35	10·17	10·29
6	4·59	6·13	4·50	6·35	11·5	11·8
7	4·58	6·13	4·50	6·36	11·49	11·45
8	4·57	6·14	4·50	6·37	nil	nil
					a.m.	a.m.
9	4·57	6·15	4·50	6·37	12·33	12·20
10	4·56	6·15	4·51	6·38	1·12	12·54
11	4·56	6·16	4·51	6·39	1·47	1·28
12	4 55	6·17	4·51	6·40	2·23	2 3
13	4·55	6·18	4·51	6·40	2·56	2·40
14	4·54	6 18	4 52	6·41	3·33	3 24
15	4·54	6·19	4·52	6·41	4·11	4·9
16	4·53	6·20	4·52	6·42	4·50	5·2
17	4·53	6·21	4·52	6·43	5·33	6·0
18	4·53	6 21	4·53	6·43	6·23	7·5
19	4 52	6·22	4·53	6·44	7·17	8·11
20	4·52	6·23	4·54	6·44	8·17	9·16
21	4·51	6·24	4·54	6·45	9·19	10·20
22	4·51	6·25	4·55	6·46	10·23	11·24
						p.m.
23	4·51	6 26	4·55	6·46	11·26	12·24
					p.m.	
24	4·51	6·27	4·56	6·47	12·28	1·23
25	4·51	6·28	4·56	6·47	1·29	2·19
26	4·50	6·29	4·57	6·47	2 29	3·16
27	4·50	6·29	4·57	6 48	3·27	4·12
28	4·50	6·30	4·58	6·48	4·25	5·7
29	4·50	6·31	4·59	6·48	5·22	6·0
30	4·50	6·31	5·0	6·49	6·20	6·52
31	...	...	5·1	6·49	...	7·40

Phases of the Moon, Occultations, &c.

9 Nov. ☾ Last Quarter 1 13 a.m.
16 „ ● New Moon 4 58 p.m.
23 „ ☽ First Quarter 12 5 p.m.
30 „ ○ Full Moon 6 11 p.m.

Apogee, 8th November at 5 36 a.m.
Perigee, 25th November at 5 36 p.m.

On the 20th November, about one hour after sunset, it will be interesting to notice that the planet Jupiter and the Moon, then nearly in its first quarter, will be apparently in somewhat close proximity in the western part of the sky. There will be, however, several millions of miles seperating the two objects as the Moon will be at a distance from the Earth of about 226,000 miles only, while Jupiter will be far away at a distance of about 700 millions of miles.

Mercury will be at its greatest elongation, 22 degrees 3 minutes east of the Sun, on the 22nd, when it will remain above the horizon 1 hour 42 minutes after sunset. The constellations in the same direction in the sky are Sagittarius and Scorpio, near the borders of which the planet will seem to be situated. As no bright stars are in the immediate neighbourhood Mercury should be clearly discernable, with Antaries the brightest star of Scopio about 15 degrees above it towards the Moon. On and about the 26th November the two most brilliant planets, Venus and Jupiter, will be apparently not very far apart in the western sky soon after sunset, with the constellation Sagittarius and Capricornus in the background. Although the Moon will be somewhat bright, being between the first quarter and full, the two principal stars of Capricornus which lie apparently somewhat remarkably close to one another should also be observable above these two planets.

On the 28th Venus will be at its greatest elongation 47 degrees 18 minutes east of the Sun, and therefore at its highest point above the western horizon after sunset. Venus will be apparently in the constellation of Sagittarius near Capricornus and will not set until 3 hours 32 minutes after the Sun.

8 Dec. ☾ Last Quarter 10 11 p.m.
16 „ ● New Moon 5 5 a.m.
22 „ ☽ First Quarter 9 8 p.m.
30 „ ○ Full Moon 12 1 a.m.

Apogee, 6th December at 4 6 a.m.
Perigee, 18th December at 12 18 a.m.

On and near the 1st December, about 8 o'clock in the evening, the Southern Cross will be at the lowest part of the circle which it apparently makes every twenty-four hours, also once every year around the South celestial pole, a point in the sky at the same distance above the Southern horizon as the position of the observer is from the equator. The Cross being at a distance of 30 degrees from the Pole, describe a circle 60 degrees in diameter. At Warwick, 28 degrees South, the pole is only 28 degrees above the horizon and the Cross therefore when at its lowest position is just below the southern horizon. This position is represented by Figure VI. on the clock face; about midnight the Cross will reach position VIII. and will be coming into view head downwards in a south-easterly position.

About midday on the 19th Venus will be occulted by the Moon, but only to a very small extent in Southern Queensland. As this will occur within four days of the new moon, a beautifully interesting phenomenon will be somewhat marred by the intense brightness of the Sun in too great proximity on the left.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.